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THE GAS JOURNAL

OCTOBER 22, 1930

A Glance at the Contents—

National Gas Council.

A report appears of this month's meeting of the Central Executive Board of the National Gas Council, when one of the subjects discussed was large-scale gas supply.

Scottish Eastern Juniors.

The Presidential Address of Mr. David Yule, of Alloa, at the opening meeting of the Scottish Junior Gas Association (Eastern District) is published.

Institution Wrought-Iron Specifications.

The Institution's Wrought-Iron Specifications have been reprinted in more convenient form, and the new booklet embodies a revised List of Approved Makers of Wrought-iron Gas, Water, and Steam Tube Strip as issued on Sept. 17, 1930.

High-Pressure Distribution in Scotland.

In his Presidential Address before the Scottish Junior Gas Association (Western District), Mr. Duncan D. Melvin, M.Inst.Gas. E., of Uddingston, deals with unification, manufacture, and high-pressure distribution from a practical point of view, as exemplified in the Middle Ward of the Lanarkshire Gas Scheme, these subjects being very much in the forefront at the present time.

Coke Breeze.

In a paper before the Institute of Fuel, Dr. E. W. Smith, C.B.E., F.I.C., M.I.Chem.E., maintains that there is no economic coke breeze problem. There are a number of technical problems connected with coke breeze which he enumerates. Coke breeze, he says, can be utilized, and is being utilized. It is worthy of greater standardization; and the most promising solution is cleaner coal.

Gas at the North London Exhibition.

Gas once again played an important part at the North London Exhibition held at the Alexandra Palace, Wood Green. The Tottenham and District Gas Company's stand was larger and more comprehensive than ever before, cookery demonstrations being a continuous attraction. At the Exhibition also were displayed some of Mr. Herbert Finn's fine paintings of industrial and other subjects, a series of which depicted various plant on the Tottenham Company's Works.

A Showroom for the Gas Industry.

An account is given on a later page of what Messrs. Falk, Stadelmann, & Co. are doing to satisfy the requirements of to-day in gas lighting, cooking, and heating by means of their very fine showrooms in the Farringdon Road, E.C. 1. The policy of the firm is to keep abreast of the times, and there is a very large department set apart solely for the display of domestic gas appliances and fittings of every description. This showroom is divided into sections, and the appliances therein are changed regularly; a wide variety being always on view.

New Coke Chute.

Mr. H. J. Toogood describes a coke chute designed to fill, discharge, and completely empty coke storage bunkers, while minimizing the formation of breeze and dust. He claims that by this device attrition of the great bulk of the coke within the bunker is circumvented, and the grade is delivered uniformly to each consumer's vehicle. A further advantage claimed by Mr. Toogood is that his chute delivers its stream so much more steadily than does the ordinary hopper outlet that it is able to feed a conveyor much more regularly, thereby preventing overloading.

Presidential Address of Sir David Milne-Watson.

We publish the Presidential Address of Sir David Milne-Watson, LL.D., D.L., to the Institute of Fuel.

Smokeless Gas Coke.

A brief review appears of the London Coke Committee's latest illustrated brochure dealing with the uses of gas coke as fuel for central heating and steam raising.

Autumn Meeting of the Institution.

We give the programme of the Autumn Meeting of the Institution of Gas Engineers, which will be held in the Incorporated Accountants' Hall, Victoria Embankment, W.C. 2.

An Address by Mr. Bloor.

The Yorkshire Junior Gas Association were addressed by Mr. H. E. Bloor, B.Sc., Engineer, Manager, and Secretary to the York Gas Company, on Saturday last. A full report of the meeting is published to-day.

Tar Problems.

We publish the discussion on the paper entitled "Some Problems and Suggestions relating to Coal Tar" which Messrs. W. J. Chadder and H. M. Spiers, of the Woodall-Duckham Companies, presented at the meeting of the Eastern Counties Gas Managers' Association last week, and which appeared in the "JOURNAL" for Oct. 15. A report of the business meeting of the Association is also published to-day.

Refrigeration: A Note for Gas Salesmen.

In an article on this subject to-day, Mrs. M. A. Cloudesley Brereton, F.R.San.I., F.I.H., F.Inst.San.E., Editor and Consultant to the "B.C.G.A.," emphasizes that refrigeration is an all-the-year-round load for our industry. The refrigeration idea itself has yet to be sold in England, not merely the idea of refrigeration by gas or any other agent. The line of approach involves patient education of the public along the lines being followed by Medical Officers and their assistants since the passing of the Food Preservation Act.

At the present time, when Notices of Assessment for Income Tax under Schedule D are being received, many gas undertakings are obtaining assistance in checking them from H. T. Seymour's

"Principles and Practice of the Assessment of Gas Undertakings for Imperial and Local Taxation,"

which elucidates very many common obscurities. Copies, for those who have not yet obtained one, are available at the "Journal" Office at 10s. 6d. net, post free.

EDITORIAL NOTES

A Statesmanlike Address

THE Presidential Address of Sir David Milne-Watson to the Institute of Fuel is of great importance, and is certain to meet with the close study in the wide field of fuel technology which its statesmanlike, calm, and unexaggerated tone merits. The reader will probably be chiefly impressed by Sir David's clearly-worded appeal for a saner outlook upon the national values of the producers of fuel in its different forms, and for the development of much greater co-operation between these producers in the marketing of energy. Ours is essentially a country which must stand or fall by the utilization of its coal resources; water power may be harnessed more, but it is most unlikely that it will seriously affect the normal production of energy in the British Isles. It is very desirable, therefore, that scientific men and the public generally should arrive at a truer perspective of the ways in which our source of energy—coal—can be best utilized.

Sir David's address is a definite help in this direction. He emphasizes, not for the first time, that electricity cannot oust gas, just as gas cannot wholly replace electricity; and he cites America as an example of the validity of this statement—if, indeed, proof be needed. Many uses of these two forms of energy are clearly defined, and they do not, or ought not to, overlap to the detriment of the consumer. The salesman of to-day in the gas industry has not a parochial view; he has already become a fuel technologist and is capable of knowing when gas, and when electricity, ought to be employed in particular circumstances. And there can be little doubt that a co-operative policy of gas and electricity, as distinct from a battle-cry of gas *versus* electricity, would in many instances lead to greater efficiency by avoiding sales at unremunerative prices, in order to secure business, and would result in enhanced customer-satisfaction. Admittedly the time is not yet ripe for this harmonious working, but the era of co-operation could be hastened in its coming by a broader conception of the fields of utility of two vast and growing industries—gas and electricity.

At present, the public, and not a few of the scientifically-minded, are, without cause, *pro* electricity and *anti* gas. Why should this be? In recent years, the increase in gas sales, converted to a common basis of heating value, has been consistently maintained at nearly twice that of the corresponding increase in the sales of public electricity. The gas industry is a conservor of coal; the electricity industry is not. The National Electricity Scheme has, it is true, resulted in a fall in the consumption of coal per unit of electricity produced; but the fact remains that the actual proportion of the heat in the coal consumed is still not much, if any, greater than 10 p.ct. throughout the entire country. Does this imply the most efficient utilization of our coal resources? Surely it would be a definite advance if the use of coked fuels could be extended by electricity undertakings. Coke and coke breeze, as was mentioned by Dr. E. W. Smith at the same meeting of the Institute of Fuel, have proved themselves admirable fuels for the generation of electricity; and Sir David states that in London practically the whole of the coke breeze made by the Gas Light and Coke Company is absorbed for the generation of steam, and that at least 100,000 tons annually is utilized by electric power stations. Such an advance could be made by co-operation between gas and electricity. "What is needed," Sir David maintains, "is a considered plan for the purpose of co-ordinating and extending the activities of the carbonizing industries with the proper linkage to electrical development."

The Outlook for Coke.

TURNING to the activities of the gas industry, Sir David explains that the production of coal gas from one ton of coal has increased from 12,700 c.ft. in 1922 to 14,250 c.ft. last year. This progressive increase in yield is naturally not so great now as it was, seeing that older plants have been superseded by more efficient units; and it is unlikely that any material increase will be made in the near future. Hence, there will be an increased demand for coal more or less proportional to the increased demand for gas; and hence also the industry's keen disappointment with the Coal Mines Act, which will raise the cost of this coal. It is difficult, too, to see how the nation, quite apart from gas consumers, can benefit from increased coal prices, which will probably result in a greater use of imported oil. The greater quantity of coal carbonized will, of course, entail a larger output of coke, the demand for which, however, is growing apace. Last year over ten million tons was sold in the home domestic and industrial markets. For some years the average growth in demand has amounted to 250,000 tons annually; last year it reached 400,000 tons, thanks to fostering the load by attention to the proper preparation and grading of coke by the carbonizing industries. In regard to this, Sir David mentions that the Gas Light and Coke Company, who produce a million tons of coke a year, have spent over £400,000 on improved coke preparation plants during the last three years. This development in the output of coke points once again to the need for co-operation; and the view is advanced that a co-ordinated national fuel policy is required. The aim should be to market coals of a higher standard free from undesirable ash. The cleaning of coal, which fortunately is progressing, would enhance the value of many of the smaller grades and extend their fields of utility, and it would open the door to the sale of coal to specification.

We call attention to two further points from Sir David's address. The first relates to low-temperature carbonization, of which subject the Gas Light and Coke Company have now had considerable experience on a large scale at Richmond. The process, explains Sir David, may now be considered as technically understood; but, as for the financial aspect, a happy ending is not yet in sight. Plants so situated as to secure good slack cheaply, and which can command a good price for the resultant solid smokeless fuel, may, he says, show a profit; but in those parts of the country at a distance from the coal-fields the difference in price that has to be paid for coal and that received from the sale of coke and gas does not appear to provide a margin sufficient to meet even operating expenses. The return from the oils has proved disappointing, though development of cracking and hydrogenation processes may help the situation. Until this comes about, and the consumer of smokeless solid fuel has to pay no more for it than he does for coal, there can be little hopeful future for any low-temperature process which has as its principal aim the production of a domestic fuel. The smokeless fuel of the future will be high-temperature coke made by the carbonization of selected, prepared, and blended coals.

The second point is co-operation as expressed by the working of the Institute of Fuel, the membership of which has increased by no less than 35 p.ct. during the year. Some of the meetings have been themselves co-operative, and a scheme is in hand for erecting a building to house the Institute and ten other technological institutions, together with the national bodies concerned with iron and steel, mining, and chemical manufacture. The institutions include fuel, metallurgy, rubber, and petroleum. As indicating the strength of the Institute of Fuel, it may be mentioned that, of the four hundred papers presented at the World Power Conference in Berlin last June, no less than one-third were prepared by members of the Institute.

Unemployment Grants

It is unnecessary to make any apology for returning to this subject, which is bound to have an important bearing on the attitude to be taken with regard to State-aided schemes for the relief of unemployment; and we note with satisfaction that the recent case of *Seaham Harbour Dock Company v. Crook (H.M. Inspector of Taxes)*—which was commented on in the Editorial Columns of the "JOURNAL" for May 21 (p. 411)—is being taken to the Court of Appeal. It will be remembered that the decision of Mr. Justice Rowlatt, in the King's Bench Division, has the effect of bringing into account for income-tax purposes Treasury Grants received by statutory and other undertakings submitting acceptable schemes to the Unemployment Grants Committee. The expressed intention prompting the payment being to enable the undertaking the better to be in a position to meet the interest charges on the loans raised for the purpose of financing such schemes, the result was a surprise to many people. Indeed, the learned Judge prefaced his judgment by saying that it was a case of some difficulty, inasmuch as it, to some extent, breaks new ground.

The widespread effect of this ruling will be appreciated, and, in this connection, our contemporary "Taxation" on Oct. 11 published an interesting article, which illustrates one way in which the definition of taxable profits has been extended. In *Whimster v. Commissioners of Inland Revenue* (1926) it was stated as a general proposition that "the profits of any particular year must be taken to consist of the difference between the receipts from the trade during such year and the expenditure laid out to earn those receipts;" but Lord Sands, in *Hyam v. Commissioners of Inland Revenue* (1929), said "one cannot apply that proposition without qualification to a continuing business." Subsequent cases have further enlarged the scope of income or receipts from business liable to tax, and the view is expressed in the article that the very wide conception of the trading activities of a concern would seem to imply that, should the Crown's defence prevail in the Seaham Harbour case, any receipt which comes into a business through a concern being engaged in business may properly be regarded as a trading receipt, and, as such, liable to assessment. Unless, therefore, the appeal is sustained, a precedent will have been established which, it is suggested, will have the effect of making the liability to tax almost limitless, except where it is clearly proved that income arises from the sale of a capital asset.

Coke Breeze

No subject is more important to our industry than the preparation and sale of coke, and few could be in a better position to discuss the problem than Dr. E. W. Smith, who, in a paper before the Institute of Fuel, devotes attention to the improvement of the revenue from coke by utilizing breeze to the best advantage. As to the main argument, the author sets this out forcibly by stating that over 95 p.ct. of the homes in England use gas, which is displacing coal: "but there would be a very great expansion in the use of gas if it were still cheaper, and no single product affects the price of gas more than coke." The potential market for coke is enormous, and there is almost limitless scope for modern well-informed salesmanship and technical development; and the conditions of this market can be bettered by making less breeze, by using more breeze and less large coke for heating settings, and by ensuring better prices for breeze by standardization of sizes and universal nomenclature. Regarding the first two means, Dr. Smith outlines several useful lines of attack, asking that the fundamental point should be remembered that breeze is small coke, having all the characteristics of coke when clean coals have been carbonized or when fine grinding is the rule; otherwise it may be higher in ash and moisture, but it is still a solid smokeless fuel of high calorific value.

Breeze utilization is divided into two fields—as boiler fuel and as producer fuel. That, rightly used, it is an excellent boiler fuel is well demonstrated in the latest publication of the London Coke Committee, to which reference is made in later columns of our issue to-day. It contains descriptions and photographs of coke-burning mechanical stokers at the Gas Light and Coke Company's Tar and Ammonia Product Works, where breeze fired by means of forced-draught chain-grate stokers has on recent trials maintained the full normal output of the boilers at an overall efficiency of 80 p.ct. An example quoted by Dr. Smith is the Deptford West power station, where up to 50 p.ct. of breeze is being employed with highly satisfactory results. There is no doubt that a remunerative market exists for coke breeze, and the public's growing appreciation of the harm done by smoke will render the sales task easier.

Turning to the utilization of breeze in gas-works, the author points out that, though steam requirements are largely met by waste-heat boilers, modern developments in the design of step-grate producers have made it possible to use increasing percentages of breeze. In this respect he cites the case of a gas-works in London employing 43 p.ct. of breeze in the producer fuel. "In this way," he says, "the whole of the available breeze was disposed of, and displaced the larger sizes of coke." As much as 60 p.ct. of the $\frac{3}{4}$-in. breeze made was thus employed, and ton for ton had almost the heating value of large coke. Then there are special producers—such as the Trefois, installed at the Bradford Road and the Partington Works of the Manchester Corporation Gas Department, which formed the subject of an important paper by Messrs. Holton and Applebee in the "JOURNAL" last week—which can gasify breeze, though in this connection Dr. Smith states that "the high capital costs of mechanical producers can only be justified if gasification rates are high, or if the fuel to be used has a very low price, and if mechanical producers are the only means available in which to gasify breeze." A still further outlet for breeze lies in blending it with coal before carbonization—an outlet which in the author's opinion is entirely practicable subject to a number of important considerations which he sets out clearly in his paper. He concludes by saying that there is no economic coke breeze problem. "Coke breeze can be utilized and is being utilized. It is worthy of greater standardization, and the most promising solution is cleaner coal."

The Team Spirit

It is the custom of the Yorkshire Junior Gas Association to commence their session's work by addresses from seniors prominent in the industry; and there is much to be said for this custom, for such addresses demonstrate the team spirit of our industry, and help and encourage the younger members. Last year the address was by the then President of the Institution of Gas Engineers, Mr. C. S. Shapley. This year it was delivered by Mr. H. E. Bloor, Engineer, Manager, and Secretary to the York Gas Company; and a full report of the opening meeting of the Association, which was held at Leeds University on Saturday last, will be found on later pages of this issue of the "JOURNAL." The "team spirit"—its virtues and the necessity for it—was emphasized by Mr. Bloor, who rightly observed that the penalty of lack of *ésprit de corps* is inevitable defeat. Such a spirit primarily depends on three factors, absence of any of which renders its existence impossible. First of all, there is the attitude of the seniors towards those employed by them, be they "officers" or workmen; and we think that, generally speaking, the attitude of those in responsible positions in the gas industry to-day is an example to industry as a whole. They are fully alive to the results which accrue from encouragement of self-expression and individuality of those in subordinate posts, and they have given of their energies in many ways to assist juniors with their problems and lend them a wider vision of the industry in which they are engaged, besides supporting whole-heartedly co-partnership and welfare schemes for the "workers."

Secondly, there is the attitude of the juniors to the seniors. The former have, we feel sure, more faith than ever in their leaders; they are showing their appreciation in cheerful service and by a good deal of hard spadework

in gaining knowledge—one medium of which is, of course, the Junior Associations—just as the workers are, by their contentment, showing their appreciation of co-partnership principles. Finally, there is the basic idea of the gas industry—that of service. The public, after years of indifference, are beginning to realize what fine service gas renders so unobtrusively; and those engaged in it have, from top to bottom, an inspiring belief in its present and in its future possibilities. The "team spirit" is essential to progress in the gas industry, as it is in every other highly-organized business concern; it is essential to research and to the application of the results of this research, to training, to the proper *liaison* between the manufacture and the sale of gas. But there is no need to enumerate the many branches of the gas industry's tree of service.

This "team spirit" does not imply that individual effort of the highest order is no longer desirable; the reverse is the case. As an example of the growth of the team spirit, we have the changed outlook of the industry towards the engineer and the salesman. No longer need the latter suffer from a sense of inferiority, which, it is true, in times past was thrust upon him; and this changed outlook implies that individual effort will be rewarded. In the past, says Mr. Bloor, advancement was for those whose entry to the industry was through the engineering side; the works manager or assistant of the day became engineer and manager of the morrow—the chief official of the concern. But Mr. Bloor feels strongly that the centre of gravity has shifted materially; distribution and salesmanship have advanced in complexity and importance, and can no longer be regarded as inferior subjects for the consideration of a chief officer. He emphasizes the importance of the viewpoint—both to themselves and to the industry—of those who, young and ambitious, aspire to the positions of chief controllers of the fortunes of gas undertakings. A one-sided view can only spell failure; super-efficient production of gas, for example, may fight a losing battle, if it is allied to inefficient commercial methods, distribution policy, and salesmanship. The tendency of the industry, states Mr. Bloor, must be to ascribe increasing importance to commercial and sales organization, which means improved prospects and a higher status for the commercial man. For the higher management, he maintains that the proper viewpoint is that of the salesman, though it does not follow that one should actually be a salesman to hold such a post. "It does imply, however, that every policy and action of every department and employee affects the commercial position and repute of the business, and the sum total provides the material with which salesmen work." In other words, we must have the team spirit.

Investment Values

In addressing members of the Incorporated Accountants' Students' Society, Mr. Hartley Withers, an acknowledged authority on financial matters, specially stressed the point that values must of necessity depend upon the amount of earning power. The earning power vested in the shares and other securities of companies is the net revenue of such concerns; and it occurs to us that, had this fact been more generally appreciated during the "boom" period on the Stock Exchange, the enormous premiums at which some stocks changed hands would not have been realized. Apart from exceptional circumstances, no security should stand at above par, unless there is definite evidence of the future stability and expansion of such earning power beyond the minimum necessary to give an adequate return on the capital invested or to maintain the fixed rate of dividend or interest on preference and debenture securities.

That the principle enunciated is sound will be obvious, for, save the distribution of any accretion of capital arising from the sale of the whole or part of the undertaking, the only fund from which the shareholder's expectations can be fulfilled is the future earning capacity of the concern.

When this principle is applied, as Mr. Withers suggested, to national and local finance, the effect is just as forceful, and may well be borne in mind by those responsible for the disbursement of public money. He pointed out that the earning power behind the securities of Government and Public Bodies was represented by the taxable capacity of the inhabitants of the particular area; and while in the case of companies the published accounts were not always a sure index to future dividends (dealing only with the financial position at a previous date in the past), neither the national accounts nor the financial statements emanating from Government Departments could be regarded as sources of information which, in his opinion, could be of great assistance to the prospective investor in Government and Local Loans. Further, the taxable capacity of the country and of the inhabitants of local areas must be taken into account, we suggest, in levying public taxes.

The Prince of Wales as Guest of Honour.

His Royal Highness the Prince of Wales has graciously consented to be the Guest of Honour at the Annual Banquet of the Incorporated Sales Managers' Association on Tuesday, Dec. 16 next. By the permission of the Corporation of the City of London, the banquet will be held in the Guildhall. The Lord Mayor and Sheriffs have accepted invitations to be present. Sir Francis Goodenough, C.B.E., the President of the Association, will occupy the chair.

Income-Tax—Schedule D.

In connection with the Notices of Assessment now emanating from the various tax offices throughout the country, it is desirable to direct attention to a point emphasized in the recently published "Principles and Practice of the Assessment of Gas Undertakings for Imperial and Local Taxation" (of which an advertisement appears in this issue), that, should an appeal against the assessment be necessary, it is essential that the local Inspector of Taxes be notified in writing, within a period of 21 days from the date of the notice signed by the Clerk to the Commissioners, specifying the grounds of the appeal. This course should be taken even in cases where the compilation of tax liability has been settled (but differs from the assessment) or is in course of negotiation.

New Coke Chute.

In view of Dr. Smith's paper before the Institute of Fuel, it is an interesting coincidence that in the same issue of the "JOURNAL" we should be able to publish a description of a new coke chute designed by Mr. H. J. Toogood to fill, discharge, and completely empty coke storage bunkers, while minimizing the formation of breeze and dust. The chute is in the form of a spiral trough. The lower side is inclined at such an angle as to ensure that the coke enters the bunker gently and with minimum breakage, while the upper side acts as a cover to support the superimposed coke within the bunker. Mr. Toogood claims that by this device attrition of the great bulk of the coke within the bunker is circumvented, and the grade is delivered uniformly to each consumer's vehicle. As he points out, normally coke dust accumulates at the lower corners of bunkers; and that occasion is apt to arise, when the bunkers are discharged more than is usual, for this accumulation of breeze and dust to be deposited in entirety in one customer's consignment. Hence complaint, and a dissatisfied consumer. A further advantage claimed by Mr. Toogood is that his chute delivers its stream so much more steadily than does the ordinary hopper outlet that it is able to feed a conveyor much more regularly, thereby preventing overloading.

Tar for Roads.

Reference is made in the current issue of "Modern Transport" to the recently published Report of the Highway and Sewerage Committee of the Sheffield City Council for the year ended March 31 last. The report deliberately sets out to correct any impression that, as a result of the increase in the use of bitumen, tar is not being employed to the same extent as formerly. It proceeds to point out that, while both bitumen and

tar have been adopted in increasing quantities during the last decade, there has been no diminution of effort as regards the utilization of the home-produced material. The report also alludes to an important development which is taking place in Sheffield, where a number of specially prepared and blended tars have been offered by the Yorkshire tar distillers and applied on about forty trial lengths of roads, extending more than eight miles. The views expressed that, from observations made under varying conditions during the summer, some of these special tar preparations have proved to be much superior to the ordinary standards, and to present an excellent surface, which, from the point of view of safety, leaves nothing to be desired.

Further Experiments—

The Minister of Transport announces that during the last few weeks road surfacing work has been in progress on the Kingston by-pass between Robin Hood Gate and Coombe Lane. This work has been arranged for by the Technical Advisory Committee on Experimental Work of the Ministry of Transport in collaboration with the County Engineer of Surrey County Council, the Asphalt Roads Association, the British Road Tar Association, and the Road Emulsions and Cold Bituminous Roads Association, Ltd. Eleven test sections have been laid, incorporating different methods of modern road construction. The purpose of the tests is to obtain comparative data for different road surfacing materials, their first cost, maintenance cost, and length of life on a road carrying fast and heavy traffic. Regular tests will be made to compare the resistance of the different surfaces to skidding under a wide range of weather conditions. For the convenience of highway authorities and others interested persons who may wish to inspect the test sections, the limits will be indicated on the site by concrete markers.

— and Further Views.

In "The Times" for Saturday last, Lord Londonderry states: With the approach of winter additional importance attaches to schemes for the relief of unemployment. In such schemes roadwork always takes a prominent place, and I should like to draw the attention of your readers to one aspect of this work that is too often forgotten. On a typical relief scheme half, or sometimes more than half, of the money is expended on materials. If, therefore, the expenditure is to have the maximum effect, it seems essential that not only British labour but British and not foreign materials should be employed. Tar for binding and surface-dressing the road metal is a case in point. Tar is derived from coal and therefore entirely British. It is a bye-product of the gas, coke-oven, and tar distilling industries which gives direct employment to nearly 200,000 workers. These industries between them treat about 35,000,000 tons of coal a year, which is the output of over 100,000 coalminers, and coalmining is one of the industries that are suffering most from the present wave of depression. Incidentally, tar is cheaper and therefore goes farther than foreign bitumen, so that more work is provided and a greater mileage of road treated with the same outlay. At present the production of road tar is 800,000 tons a year, but that quantity could easily be doubled. If this bye-product cannot be profitably disposed of, the result must be to raise the prices of gas, coke, and even steel, so that almost every one has an interest in the use of tar.

Gas Salesmanship Courses in U.S.A.

In an address before the Pacific Coast Gas Association last month, Mr. Alexander Forward, Managing Director of the American Gas Association, explained that the Association's course in domestic gas salesmanship, which has already been completed by 2500 officers and employees in the gas industry of the United States, and is now being studied by 850 more, has met with unanimous approval. The industrial gas sales course, he said, is fairly launched, and is being received with enthusiasm; sales management study is well on the way; and a course in public contracts is being prepared, applicable to employees in whatever branch of the industry, and designed so that the public will understand why the gas industry is in business and what it can do for them.

Dealer Co-Operation.

Mr. Forward, in the same address, referred to dealer co-operation, which is making such headway in America, and is certainly not without interest to our readers at the present time. Such co-operation, he said, is a necessity; and by "dealers" he implied plumbers, hardware and department stores, and mail order houses. Here is a quotation from his address: "There can be no question that the activities of dealers in electrical appliances are to a very large degree responsible for the growth of that sister industry. We cannot afford to have these elements fight us, except in friendly and open competition; and it is all to our benefit if we have them in friendly mood. Nor will they help us from any feeling of sentiment. The only way to get co-operation with other trades is to make it possible for them to profit and to help them succeed."

PERSONAL

Mr. LAWRENCE E. DOUGALL, son of the late Mr. James Dougall, has been appointed to represent Messrs. Dougall's Gas Meters, Ltd., Church Wharf, Chiswick, W. 4.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Oct. 24.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Opening Meeting at the Westminster Technical Institute, 7.30 p.m. Presidential Address of T. H. Prater, M.Inst.Gas E.

Oct. 25.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to Works of Messrs. C. & W. Walker, Ltd., Donnington, Salop.

Oct. 25.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Swansea.

Oct. 27 to 29.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Meeting at Hull and Bridlington.

Oct. 30.—GAS COMPANIES' PROTECTION ASSOCIATION.—Meeting of the Committee, at 5, Victoria Street, S.W. 1, at 2 p.m.

Oct. 31.—INSTITUTION OF CHEMICAL ENGINEERS.—Lecture by Prof. W. A. Bone on "High-Pressure Reactions."

Nov. 5.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to Refractory Works, Woodall-Duckham Company, Stourbridge.

Nov. 6.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Meeting at Grand Hotel, Birmingham, 2.30.

Nov. 8.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Joint Meeting with Western District, Edinburgh. Address by Mr. D. Warden, of Dundee.

Nov. 8.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—See Eastern District above.

Nov. 11.—INSTITUTION OF GAS ENGINEERS.—Meeting of Education Executive Committee, 4 p.m., at 28, Grosvenor Gardens, S.W. 1.

Nov. 13.—MIDLAND JUNIOR GAS ASSOCIATION.—W. E. Benton on "Oven Temperature Control and Design of a Bi-metal Thermostat."

Nov. 15.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to Coatbridge Gas-Works.

Nov. 19.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn General Meeting in London.

Nov. 21.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—General Meeting in London.

Nov. 21.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—J. M. Webber, "Electrical Plant as Applied to Gas-Works."

Nov. 21.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to Beattie's Bakery, Dennistoun, Glasgow.

Nov. 24.—INSTITUTION OF GAS ENGINEERS.—Meetings of Executive Committee, 2 p.m.; Finance Committee, 3.30 p.m.; Council, 4 p.m.; at 28, Grosvenor Gardens, S.W. 1.

Nov. 25-26.—INSTITUTION OF GAS ENGINEERS.—Autumn Meeting at the Incorporated Accountants' Hall, Victoria Embankment, W.C. 2.

THE NEWS OF THE WEEK

The Price of Gas in Newtownards (Co. Down) has been reduced from 5s. 10d. to 5s. 5d. per 1000 c.ft. The price for industrial and trade purposes is 4s. 7d., and for high-pressure 6s. 3d. per 1000 c.ft.

A Reduction in the Price of Gas is announced by the Abertillery Gas Department of 4·3d. per 1000 c.ft. for lighting, cooking, and heating purposes, with a further reduction of 3d. per 1000 c.ft. for consumptions over 10,000 c.ft. per quarter.

Contributions to Charities by the employees of Messrs. Alder & Mackay, Ltd., Gas Meter Manufacturers, of New Grange Works, Edinburgh, have been made as follows: To the Royal Infirmary of Edinburgh, £72 18s. 3d.; to the Royal Edinburgh Hospital for Sick Children, £41 13s. 8d.; and to the Queen's Institute of District Nursing, £38 14s. 5d.; a total of £153 6s. 3d.

An Issue of 2000 Preference Shares of £5 each is being made by the Directors of the South Bank and Normanby Gas Light and Coke Company. These shares are entitled to a non-cumulative dividend of 6 p.ct. out of the profits of the Company in any year. As will be seen from last week's advertisement columns, copies of the prospectus may be obtained from the Secretary of the Company.

"On Guard" is the title of a special little pocket magazine issued by the National Safety First Association as part of a specialized accident prevention service, which consists of an intensive campaign each month against one of the principal dangers of industry. This month the particular hazard covered is fire, which costs this country some £12,000,000 a year. The magazine deals with various aspects of health, as well as safety, at work, in the street, and in the home.

A Lantern Lecture on "The Production and Uses of Town Gas" was given by Mr. J. B. Balmforth, Manager of the Bingley Urban District Council Gas-Works, and Mr. W. Longbottom, also of Bingley, to a gathering of the Keighley Co-operative Men's Guild recently. Both old and modern gas appliances were shown on the screen and their uses, disadvantages, and advantages described by Mr. Balmforth, who went on to explain the benefits of using gas made at an absolutely up-to-date plant like that at Bingley, with modern fittings on the consumers' premises. Mr. Balmforth extended to the Guild a hearty invitation to visit the Bingley gas-works in the near future.

The Coke Ovens and Bye-Product plant of the Lancashire Foundry Coke Company, at Moorfield, Altham, was visited on Oct. 11, by the Manchester Geological Society and the National Association of Colliery Managers. H.M. Inspector of Mines also attended. The Manager, Mr. D. V. Hollingworth, F.I.C., M.I.Chem.E., explained that there were in operation 54 coke ovens, each capable of carbonizing about 14 tons of coal in 24 hours, together with necessary gas condensers, exhausters, ammonia and benzole scrubbers, gasholders, and gas compressors. The Company are now supplying coke oven gas in bulk to Accrington District Gas Board and to the Burnley Corporation.

A Large Band of Housewives gathered at the Brighton and Hove General Gas Company's lecture hall on Oct. 14, for the first of the autumn series of cooking hints. These lectures are conducted throughout the year, and not only do they show the women of the district the correct way to prepare their dishes, but also how to get the maximum work out of their ovens at the minimum cost. Mrs. Iredale is once again to be the chief lecturer, and she will be assisted by Miss Taylor and Miss Gott. As is his usual custom at the commencement of a new series, Mr. P. E. Brown, the Distribution Engineer, gave the visitors a welcome. The lectures, which are free, will be continued on Tuesdays and Thursdays at 3 p.m. and Wednesdays at 7 p.m.

The Clitheroe Gas-Works have undergone reconstruction and re-organization, at a cost of £48,000. They were formally re-opened by the Chairman, Ald. J. Thornber, J.P., on Oct. 8. He said the work had occupied two years. He gave an interesting account of the undertaking, from its commencement as a private company in 1836. The Corporation acquired it in 1878, and now produced over 850,000 c.ft. of gas per day. Between 1908 and 1912 the works were rebuilt, and the output almost doubled. In 1923 further extensions were necessary, and in 1927 the Corporation were faced with a remodelling of the works. The town was now assured of an efficient supply and an adequate pressure. The new holder had a capacity of 500,000 c.ft. compared with the 320,000 c.ft. of the two discarded holders. It was 105 ft. high and 87 ft. in diameter.

The Last Instalment of the loan on Withnell Gas Undertaking has been paid by the Withnell Council. The Chairman of the Gas Committee (Mr. J. O. Farrar) states that the Council will now save an annual expenditure of £600, equivalent to 10d. off the rates or a reduction of 8d. for 1000 c.ft. off the gas. Twenty-five years ago the works cost £20,000, and they still suffice for the district.

Bedford Stock Issue.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of the Bedford District Gas Company, an issue of £20,000 5 p.ct. perpetual debenture stock at a minimum price of issue of £95 per £100 worth of stock, yielding at that price £5 5s. 3d. p.ct. Tenders for this stock must be received not later than 11 a.m. on Tuesday, Oct. 28.

A Fire occurred on Oct. 11 at the naphthalene distillery attached to Moorfield Pit, Altham, where coke oven gas is produced in large quantities for consumption by the Accrington Gas Board and the Burnley Corporation. The Accrington Brigade turned out with two engines and found the tar boiler in flames at the distillery 60 yards from the oven. The boiler, however, is only about 12 yards from the naphthalene tank. The Brigade ran a hose to the canal and quelled the outbreak in about an hour.

Western Junior Gas Association.

The Association held their Annual Dinner on Saturday, Oct. 4, when about forty members attended at St. Stephen's Restaurant, Bristol.

The Chair was taken by the President (Mr. J. T. Spencer), who was supported by three Hon. Members—Mr. S. E. Halliwell (Secretary and Commercial Manager of the Bristol Gas Company), Mr. R. Robertson (Engineer of the Bristol Gas Company), and Dr. M. W. Travers, F.R.S., of Bristol University. There were also present Mr. James Taylor (Engineer of the Weston-super-Mare Gas Company), Mr. R. G. Pole (Great Western Railway), and Mr. C. Southern (Writhlington Collieries, Ltd.).

After the Loyal Toast, Mr. C. Bateman, on behalf of the members, presented the retiring Secretary, Mr. G. C. Gunston, with a wrist-watch, in appreciation of his untiring activities in the interests of the Association since its inception in 1926.

During the evening the President vacated the chair in favour of Mr. A. Barrett (Frome), the President for the coming season, who then presented to Mr. Spencer the President's Certificate of Office.

Lighting in Westminster.

At the last meeting of the Westminster City Council the Traffic and Public Lighting Committee reported that they had had before them particulars of the existing contracts for public lighting in the City. It was stated that the lighting of the area St. James's Street, St. Margaret's, and Strand Board was by the Gas Light and Coke Company—date of contract, May 23, 1910, and supplementary contracts; number of lamps, 3067; date of expiration of contract twelve months' notice by either party on any day of any year. It was decided that formal notice be given to the Gas Light and Coke Company of the termination on Dec. 31, 1931, of their contracts with the Council for public gas lighting in the City.

The Committee reported that in connection with the rebuilding of Lambeth Bridge and the improvement of Grosvenor Road and Horseferry Road they had had under consideration the question of street lighting of the western approach to the new Lambeth Bridge. The existing lighting of Grosvenor Road generally was by 300-c.p. gas lamps. On the completion of the new bridge, the western approach would become an important traffic circus, and considerable improvements had been made in the vicinity by the widening of adjacent streets and the erection of new and extensive buildings. It appeared to the Committee, having regard to the fact that the present lighting was by gas lamps that, subject to the result of their review of the lighting of the City as a whole, gas lighting should be continued, but that high-pressure gas lamps should be used.

Institution of Gas Engineers.

Autumnal Research Meeting.

INCORPORATED ACCOUNTANTS' HALL, VICTORIA EMBANKMENT, LONDON, W.C. 2, NOV. 25-26, 1930.

ADVANCE PROGRAMME.

Monday, Nov. 24.

2.0 p.m.	Executive Committee Meeting	Council Chamber, 28, Grosvenor Gardens, London, S.W. 1.
3.30 p.m.	Finance Committee Meeting	
4.0 p.m.	Council Meeting	

Tuesday, Nov. 25.

10.15 a.m.	1. Secretary to read the Notice convening the Special General Meeting.
	2. Appointment of Scrutineers for Membership Ballot.
	3. (*a*) Presentation of Charles Hunt Memorial Medal for Diploma Examination in Gas Engineering, 1930.
	(*b*) Presentations of Diplomas in Gas Engineering, 1930.
	4. Report of the General Research Committee, 1930-31.
	5. Twenty-Sixth Report of the Joint Research Committee of the Institution and Leeds University; Cracking of Gas Oil and Creosote under Water Gas Conditions.
	6. Twenty-Seventh Report of the Joint Research Committee of the Institution and Leeds University; Preliminary Report on the Back-Run Process for Water Gas Manufacture.
12.30 p.m.	7. Adjournment.
2.30 p.m.	8. Twenty-Fifth Report of the Joint Research Committee of the Institution and Leeds University; Examination of Products of Combustion from Typical Gas Appliances. Part V.
	9. Report of the Refractory Materials Joint Sub-Committee.
	10. Report of the Corrosion of Pipes Sub-Committee.
5.0 p.m.	11. Adjournment.

Wednesday, Nov. 26.

10.15 a.m.	12. Final Liquidation Meeting of old Institution.
10.30 a.m.	13. 1930 Report of the Gas Research Fellowship; The Influence of Inorganic Constituents in the Carbonization and Gasification of Coal: The Liberation of Ammonia, by A. H. Eastwood (Research Fellow), and John W. Cobb (Livesey Professor).
	14. Fifth Report of the Liquor Effluents Sub-Committee, including a Report by Dr. Monkhouse on a visit to Phenol Recovery Plants in Germany.
	15. Discussion on the Sectional Report of the Ammonia Sub-Committee (presented 1929) on the Recovery of Ammonia in Gas Manufacture; Indirect, Semi-direct, and Direct Processes, by Dr. A. Parker.
12.45 p.m.	16. Adjournment.
2.30 p.m.	17. Third Report of the Ammonia Sub-Committee, including:
	(*a*) The Feld Process, by Dr. A. Parker.
	(*b*) The Use of Anhydrite in the Production of Ammonium Sulphate, by Mr. P. Parrish.
	(*c*) A Summary and Survey of the Sectional Reports of the Ammonia Sub-Committee, by Dr. E. W. Smith and Mr. H. Hollings.
	18. Other Reports and Adjourned Discussions.
	19. Scrutineers' Report of Membership Ballot.
	20. Votes of Thanks.
5 p.m.	21. Termination of Special General Meeting.

National Gas Council.

Central Executive Board.

A Meeting of the Central Executive Board was held at 28, Grosvenor Gardens, S.W. 1, on Tuesday, Oct. 14, at 2.30 p.m. —Sir DAVID MILNE-WATSON in the Chair.

Before proceeding with the business of the meeting, the Chairman reported with deep regret the death of Mr. Samuel Glover. Sir David said that Mr. Glover would always be remembered for the important rôle which he had played in connection with the gas industry during a critical period in the history of this country. He had been President of the Institution of Gas Engineers, and was one of the original members of the National Gas Council when it was first formed in 1916. Mr. Glover would be greatly missed by his many friends and colleagues in the gas industry.

A vote of sympathy was passed to Mrs. Glover and her family —all members standing.

COAL MINES ACT.

The steps which the Council were taking to ensure that the gas industry should have adequate representation on certain of the Committees of Investigation which are to be set up under this Act were reported.

NORTH OF ENGLAND COKE RESEARCH COMMITTEE.

A letter from the Secretary of the Northern Coke Research Committee, suggesting that the Council should support the work which was being undertaken in connection with coke research, was further considered, and remitted to the Institution of Gas Engineers.

ANALYSIS OF COAL.

Mr. F. P. Tarratt was unanimously appointed to take the place of Mr. L. H. Sensicle as a representative of the Council on the Joint Committee of the Institution of Gas Engineers and the Council, which is considering the British Standard Specification for the Sampling and Analysis of Coal for Inland Purposes.

DEPARTMENTAL COMMITTEE ON GAS POISONING.

A report prepared by the Gas Safety Committee as to the best methods of carrying into effect the recommendations of the Report of the Departmental Committee on Deaths from Gas Poisoning was considered by the Board, and approved.

With regard to Recommendation 3 of the Departmental Committee, that a central body of representatives of the various branches of the gas industry should be set up to institute and encourage research, and to improve the safety and efficiency of the apparatus used in the distribution and supply of gas, it was decided that the four representatives of the National Gas Council on this central body should be nominated by the Gas Safety Committee.

LARGE-SCALE GAS SUPPLY.

The Chairman reported a meeting which had taken place between the Joint Committee of representatives of the Institution of Gas Engineers, the British Commercial Gas Association, and the Council, together with Chairmen and Technical Representatives of certain undertakings situated in large industrial centres throughout the country, to consider a scheme which had been formulated by the Joint Committee for the purpose of developing large-scale gas supply for commercial and industrial purposes throughout the country. The matter was explored at great length and enthusiastic support given to the proposals.

It was unanimously decided that immediate steps should be taken to call meetings of the District Executive Boards for the purpose of submitting to them proposals for dealing with this question. It was also reported that the Chairmen and Secretaries of these Boards had been called to a meeting in London that day in order that they might be in a better position to explain the scheme to their members in the various districts.

An Attractive Gas Fire Catalogue.

The new season's gas fire catalogue of Messrs. Fletcher, Russell, & Co., Ltd., of Palatine Works, Warrington, is a well produced and attractive publication, with a cover design in green, black, and gold.

A particular feature is made of the firm's latest range of art finishes for gas fires, and a set of fires in beautiful finishes of old gold, silver, and copper bronze are depicted in actual colours. A foreword to the catalogue explains the function and effect of the "injector-ventilator" system, and also the advantages accruing from the now well-known "Beam" radiants, which are standard on every Fletcher-Russell gas fire. In order to find the size of the gas fire suitable for various sizes of rooms, a table is given, indicating the number of radiants recommended for adequately heating a room of any given area from 7 ft. sq. to 16 ft. by 27 ft.

The centre spread of the catalogue is particularly attractive, showing in actual colours the "Phœnicia" and the "Toledo" fires in beautiful tiled surrounds and oak mantelpieces. These illustrations serve as an indication of the striking appearance of these new gas fires, the actual work being rich and extremely impressive.

A wide range of other makes of fire is included, with full specifications and illustrations, while a final section shows the latest of Fletcher, Russell's range of gas radiators, which are claimed to be rapid in heating, easy to fix, and safe and economical in use, being supplied in any number of columns, each column governed by a separate tap.

Smokeless Gas Coke.

The London Coke Committee have published a new illustrated brochure dealing with the uses of smokeless gas coke as fuel for central heating and steam raising.

The brochure points out that the cost of power and heat is a factor of increasing importance in the work of enlarging production; and to improve and cheapen these commodities are the constant aims of the gas industry. Smokeless combustion and efficient combustion are largely synonymous terms; and practical ways and means are indicated, by independent and influential steam users, whereby maximum efficiency and minimum cost of steam production have been attained, and the prevention of smoke effected, on many important central heating and steam boiler plants.

Detailed results of official boiler tests with gas coke and coal as fuels for use in boilers of all the popular types are given in the brochure; and a fair but telling comparison is drawn between the practical and financial advantages of oil fuel and coke fuel. In one case cited a gross saving of £30 was effected

THE NEWS—continued.

on a weekly oil fuel bill of £120, by substituting gas coke for oil.

Coke-burning mechanical stokers are illustrated and described, and the patent "Sandwich" system of blending coke breeze and coal, as installed in the new 125,000 kw. Deptford West power station of the London Power Company, Ltd., is also shown. This power station, which operates at all loads with practically no visible smoke emission, at efficiencies of 85 to 88 p.ct., has been described by one Medical Officer of Health as a model of what electric power stations should be, in regard to smoke and grit effluent.

Institution Wrought Iron Specifications.

We have received from the Secretary of the Institution of Gas Engineers a copy of the reprint of the Wrought Iron Specifications. This has been produced in a more attractive and convenient form, and embodies a revised List of Approved Makers of Wrought-iron Gas, Water, and Steam Tube Strip as issued on Sept. 17, 1930.

The Specifications were drawn up on Feb. 9, 1927, and relate to

1. Wrought-iron gas, water, and steam tube strip, and
2. Wrought-iron gas, water, and steam qualities tubes and fittings.

The following names are now on the List of Approved Makers of Strip:

John Bagnall & Sons, Ltd., Wednesbury, South Staffordshire.
John Bradley & Co. (Stourbridge), Ltd., Stourbridge Iron Works, Stourbridge.
Butterley Company, Ltd., Butterley Iron Works, Derby.
David Colville & Sons, Ltd., 195, West George Street, Glasgow.
Etna Iron and Steel Company, Ltd., Etna Iron and Steel Works, Motherwell, N.B.
George Gadd & Co., Ltd., Church Lane Iron Works, Tipton.
Hart's Hill Iron Company, Ltd., Hart's Hill Ironworks, Brierley Hill.
N. Hingley & Sons, Ltd., Netherton Iron Works, Dudley.
Johnson's Iron and Steel Company, Ltd., Hall End Iron Works, West Bromwich.
Lancashire Steel Corporation, Ltd., Warrington.
William Martin, Sons, & Co., Dundyvan Iron Works, Coatbridge.
Midland Iron Company, Midland Iron Works, Rotherham.
Monks, Hall, & Co., Ltd., Warrington.
Patent Shaft and Axletree Company, Ltd., Wednesbury.
Pather Iron and Steel Company, Ltd., Pather Iron and Steel Works, Wishaw, N.B.
Raine & Co., Ltd., Gibb Chambers, Westgate Road, Newcastle-on-Tyne.
Scottish Iron and Steel Company, Ltd., 53, Bothwell Street, Glasgow, C. 2.
Sheepbridge Coal and Iron Company, Ltd., Chesterfield.
Shropshire Iron and Steel Company, Ltd., Hadley, near Wellington, Salop.
Thomas Walmsley & Sons, Atlas Forge, Bolton.

Copies of the Specifications can be obtained from the Secretary of the Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1., price 1s., including postage.

Institute of Fuel.

The newly-formed North-Western Section of the Institute of Fuel held their inaugural meeting on a recent date, at the Engineers' Club, Manchester—Mr. R. A. Burrows, Deputy-Chairman of Manchester Collieries, Ltd., in the Chair.

Dr. R. Lessing opened a discussion on the proposed British Standard Specification for the Sampling and Analysis of Coal by giving an outline of the steps which led to the formulation of the Draft Specifications, and called attention to the difficulties with which the Committees and Panels concerned had been faced. He said that, considering the idiosyncrasies of individual analysts, the limitations of experimental facilities, the diversity in degree of competency to be expected from an unknown army of operators, and, strangely, the lack of experimental evidence on many points concerning even the most common methods in daily use, the specifications produced must be regarded as very useful stepping-stones towards unification in methods for appraising and comparing the value of various coals for different purposes.

Taking all circumstances into consideration, these specifications should be commended for general acceptance, both at home and abroad, by analysts and by the commercial and industrial interests whom they serve. By judicious revision dictated by the experience gained in daily use, any shortcomings of the present recommendations will be eliminated, and a gradual tightening-up of the standards will follow. The obvious result will be that the coal trade, and particularly the preparation branch of the mining industry, will pay an increasing attention to the quality of their products, and will thus enhance the good name of British coal which has been earned by its inherent properties, and maintain or retrieve it where this fuel is in danger of losing its reputation.

A lively exchange of views ensued in which members and visitors took part. The meeting gave a good send-off to the North-Western Section, which augurs well for the policy of the Institute of Fuel to carry its useful work to the Provinces by the formation of further local branches.

Notes from Scotland.

A Scheme to Amalgamate Greenock, Gourock, Port-Glasgow, Kilmacolm, and Inverkip is at present being considered unofficially by members of the Gourock Town Council. The scheme was rejected by Parliament in 1925, but it is urged that the amalgamation of the various services would be of great benefit, and would result in the cheapening of gas.

The Dunfermline Gas Department were among the exhibitors at the exhibition organized by Dunfermline traders which was held in St. Margaret's Hall recently. At the Department's stand were shown the latest domestic labour-saving appliances, including, heating, refrigeration, water heating, lighting, and cooking, while special demonstrations of gas cooking were given.

The Cowdenbeath Gas Company, Ltd., have communicated with Fife County Road Board, urging that part of the cost of alterations and improvements to public highways carried out by the Company should be borne by the Road Authority. As the Road Authority have no powers to make such a contribution, the Ministry of Transport have been asked to give a ruling on the matter.

Plans Have Been Passed for extensive alterations to be carried out at the Granton Gas-Works, Edinburgh, at an estimated cost of £150,000. The scheme consists of the duplication of the existing plant. Forty-four vertical retorts are to be installed, suitable for both coal and coke handling, to deal with 530 tons of coal per day, and capable of producing 8 million c.ft. of gas daily. The extension, which, it is expected, will be completed within sixteen months, is required on account of the rapid growth of the use of gas in the city, approximately 40 p.ct. during the past ten years.

Corporation Undertakings' Results.

Padiham.

The Gas Engineer, Mr. H. D. Robinson, reports a net profit on the year's working of £2136, as compared with £896. The gas sold per ton of coal carbonized was 13,280 c.ft., the highest figure attained with the present carbonizing plant, and due in a great degree to the efforts made in the district to reduce the leakages to the lowest possible figure.

Kendal.

The gross profit amounted to £5583, as compared to £5081 for the previous year. This is accounted for by the fact that all meters were read 3 to 4 weeks earlier this year than a year ago. The gas made during the year was 129,934,900 c.ft., being an increase of 6,740,000 c.ft. over the previous year. There was an increase of 106 in the number of consumers. The number of cookers in use at March 31, 1930, was 2457, being an increase of 190 over last year. Further to this, 118 wash-boilers and 101 gas fires were installed, together with a considerable number of miscellaneous appliances, such as gas irons, geysers, boiling rings, gas switches, &c. During the year the make of gas improved by 728 c.ft. per ton of coal carbonized, the total yield now being the highest in the history of the undertaking. During the year 3090 ft. of new cast-iron mains were laid, and 2694 ft. renewed, together with over 2000 ft. of new steel main.

Notes on New Books.

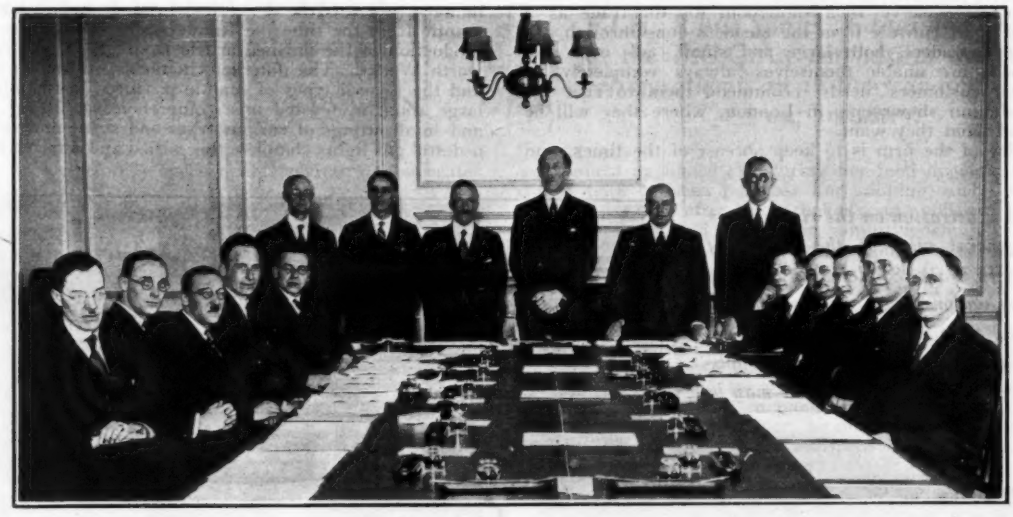
ORGANIC ANALYSIS.*

The Fifth Edition of Allen's "Commercial Organic Analysis," Vol. VIII.—a work which needs no introduction to our readers—has been published. Edited by C. Ainsworth Mitchell, the volume concerns itself with glucosides, non-glucosidal bitter principles, enzymes, putrefaction bases, animal acids, the cyanogen compounds, the proteins, and the digestion products of proteins; and the following are contributors: Julius Grant, G. Barger, K. G. Falk, Philip B. Hawk, O. Bergeim, G. H. Buchanan, S. B. Schryver, and H. W. Buston.

* "Allen's Commercial Organic Analysis," Fifth Edition, Vol. VIII Published by J. & A. Churchill; price 30s. net.

JOINT JUNIOR COUNCIL

This Year's Meeting took place in London, with the Gas Light and Coke Company as Hosts.



Mr. R. W. Foot, General Manager of the Gas Light and Coke Company (London), welcoming, on behalf of the Governor and Directors, the Presidents, Vice-Presidents, and Secretaries of the Junior Gas Associations of England, Scotland, and Wales at their Joint Council Meeting under the Chairmanship of Mr. F. S. Larkin, A.M.I.M.E., the retiring President of the London Association (on Mr. Foot's right). Mr. T. H. Prater, of Margate, the incoming President of the London Association, is on Mr. Foot's left.

By the kindness of the Governor and Directors of the Gas Light and Coke Company, the Annual Council Meeting of the Presidents, Vice-Presidents, and Secretaries of the Junior Gas Associations of England, Scotland, and Wales was held at the Chief Office of the Company, Horseferry Road, Westminster, on Monday last, with Mr. F. S. Larkin, A.M.I.Mech.E. (the retiring London President), in the chair.

Before the meeting started, a very cordial welcome was extended to the members on behalf of the Governor and Directors of the Company, by Mr. R. W. Foot (General Manager), who expressed their pleasure at being able to offer the Council accommodation for their meeting. In fact, it would have been wrong if this particular meeting had not been held at Horseferry Road, as Mr. Larkin, the Chairman, had been with the Company for many years.

After the business meeting (a report of the proceedings at which will be published later), the visitors were the guests of the Gas Light and Coke Company at luncheon, at the Grosvenor Hotel. Mr. T. Hardie (Chief Engineer) was in the chair; and he was supported by Mr. R. W. Hunter (Engineer of the Beckton Works) and Mr. E. G. Stewart. The Company were heartily thanked for their generosity, on the proposition of Mr. W. J. Pickering, seconded by Mr. J. Alsop. In reply, Mr. Hardie said that the Governor and Directors of the Company were glad to have this opportunity of marking their appreciation of the valuable work accomplished by the Associations, and they were particularly pleased that the opportunity arose during the Presidency of Mr. Larkin, who was one of the original members of the London and Southern District Junior Gas Association, formed nearly thirty years ago. The Gas Light and Coke Company always endeavoured to do their best for their juniors, and Mr. Larkin was an excellent example of the result of this policy. The Stove and Meter Works at Harwood Terrace, over which he had control, was an exceptionally fine place, and the arrangement of the works embodied Mr. Larkin's ideas.

Visit to Beckton.

The afternoon was devoted to a visit to Beckton (the journey to which was made by motor coach); and a general survey of the works was undertaken, by the aid of the Company's private railway system. The chief item of interest was the coke oven plant now in course of erection, details of which have already appeared in the "JOURNAL." This, as may be imagined, is in itself a works of considerable size, and when completed will be a self-contained unit from which valuable data will be obtained as to costs, efficiency, &c. The unloading of coal ships by means of electric cranes on the pier was seen, and the rapidity with which the grabs, each handling 3½ tons of coal, work was much admired. From here the party were conducted to No. 2 Retort House, where a new type of "flush conveyor" is in use for cooling the coke and conveying it from the retorts. As the coke is pushed from the retorts, it falls into a reinforced concrete trough, in which there is a rapid flow of water. The red hot coke falling into the water becomes surrounded with a large volume of steam, which prevents its becoming sodden, and the rapidly flowing water conveys it quickly out of the retort house, where the water falls away through a grid to be pumped up again for further use. By this method of handling, the coke is efficiently cooled, and on analysis is found to contain far less moisture than had resulted from using water in any other way. At the same time the coke does not get broken up nearly so much as when taken away by the ordinary chain conveyor, and breeze is therefore reduced to a minimum. The repair shops were visited, and the magnitude of the work carried on was seen to be in keeping with the huge size of this manufacturing station. The electric generating plant was viewed, and it was explained that this plant is now capable of producing sufficient power for the whole of the works. Everything at Beckton is, of course, on such a vast scale that in a two-hour visit only a brief glance can be taken at the most important items.

Mr. Hunter presided at a very acceptable tea, and he, Mr. Hay, Mr. Anderson, and Mr. Stewart were thanked sincerely by Mr. T. H. Prater on behalf of the Joint Council for the valuable time they had given up that afternoon. Mr. Hunter, in reply, on behalf of himself and his assistants, said they were sorry that time was so short; but if any of the members were interested in any particular item or process he would be glad to welcome them at some future date, when any information that was required could be given.

A SHOWROOM FOR THE GAS INDUSTRY.

An account of what Messrs. Falk, Stadelmann, & Co. are doing to satisfy the requirements of to-day in gas lighting, cooking, and heating.

The customer would indeed be hard to please if he could not satisfy his requirements at Messrs. Falk, Stadelmann, & Co.'s showrooms in Farringdon Road, E.C. 1. These spacious premises serve as a showroom for the trade as a whole, and apart entirely from the business done through gas undertakings, traders, both large and small, all over the country, who are unable themselves always completely to satisfy their customers' needs recommend them to visit the Falk-Stadelmann showrooms in London, where they will be sure to find what they want.

The policy of the firm is to keep abreast of the times, and there is a very large department set apart solely for the display of domestic gas appliances and fittings of every description. This showroom is divided into sections, and the appliances therein are changed regularly; a wide variety is always on view.

The illustration on the right shows a general view of the section of Messrs. Falk, Stadelmann, & Co.'s Farringdon Road Showrooms devoted to lighting and heating, indicating the wide range of appliances from which selection may be made.

On the left is the cooking and water-heating section, where a large variety of up-to-date gas cookers, geysers, &c., is displayed, together with a number of wash-boilers, rings, and other small apparatus.

Heating and Lighting.

One half of the showroom is devoted to gas heating, cooking, and lighting. In this section there are no fewer than 37 different types of fireplaces in various colour schemes, and in each one of these is a gas fire in an appropriate finish to harmonize with the surround. Many other fires, radiators, &c., are displayed on stands in the centre of the room. One of the most attractive fires to be seen in this section is the "Calydon," which is in a beautiful finish of oxidized brass, complete with "dogs," removable nickel-plated fender, non-corrosive shield, and brass nozzles. An example of the "Silo" fire with the patent "New Century" lighter attached (about which we wrote in the "Journal" for Sept. 17) is also to be observed. Another attractive finish is imitation grained wood.

Overhead is a comprehensive array of different lighting shades, bowls, and fittings—the majority connected up for demonstration purposes. Some very beautiful bowls in "Onyx," "Flakestone," "Radiolux," and "Pearlstone," satin finished, are among these, and exemplify the degree of excellence to which modern gas lighting can be brought. Several most attractive varieties of "panel" lighting are to be seen; and, as a further demonstration of the gas switch, a number of fittings are connected up with distance control.

Another interesting display shows the various stages in the manufacture of the "Veritas" modern incandescent gas mantle from the time the Ramie stalks are gathered until the production of the finished article from the Company's Wandsworth Works. The different chemicals utilized in the process and the several types of mantle produced are exhibited. One large stand is devoted to a comprehensive display of burners and small fittings of various types and sizes; and standard and pedestal gas lights complete this varied and attractive section.

The Cooking Side.

The other section of this showroom is devoted to the cooking and water heating side, and here an extensive range of cookers—all in attractive white or mottled enamel finishes—is to be seen. The well-known "New Reliable" and "Bakerloo" series are in evidence, with their patent reversible boiling and grilling burner, safety drop-pattern oval taps, and the "Autocook" oven heat regulator. Gas hotplates, irons, pokers, soldering irons, tinmen's stoves, toasters, &c., are displayed, while there is a range of some forty different varieties of boiling rings so set out on a special rack that they can all be seen at a glance and the required type selected with a minimum of trouble. Here also are a number of geysers and water heating appliances, together with a variety of wash-boilers, some in attractive mottled enamel finish. An interesting model of wash-boiler to be seen is one which, by the turning of a tap, can be converted to supply hot water for bath purposes.

A large portion of the showroom premises are devoted to a display of up-to-date lighting bowls and fittings, which are hard to distinguish from electric light fittings. An interesting and possibly unique feature of these lighting display rooms is that every vestige of natural daylight is excluded, so that the fittings can be viewed while giving the pure artificial light, thus showing the exact effect the particular bowl or fitting will produce under ordinary working conditions. One can literally say that there are thousands of shades, bowls, globes, and fittings of the

most varied, ornate, and attractive description from which to choose. In the glass showroom the walls are panelled in black, and shelves of globes can be flood-lighted to show the true effect of the colouring, while arranged on sloping panels is a further display of bowls, each fitted up for demonstration purposes.

A Progressive Policy.

As has already been indicated, Messrs. Falk, Stadelmann, & Co.'s showroom policy is a progressive one; and their Showroom Manager is an acknowledged expert in showroom display. The firm is fully abreast of modern gas practice and is continually introducing on the market fresh appliances and fittings to attract the public to the further use of gas. Their aim is to help the gas industry all they can by the production of efficient and up-to-date appliances, and these fine showrooms are well worthy of the industry which they serve.

REFRIGERATION:

A NOTE FOR GAS SALESMEN.

Mrs. M. A. Cloudesley Brereton, F.R.San.I., F.I.H., F.Inst.San.E., Editor and Consultant to the B.C.G.A., emphasizes the fact that refrigeration is an all-the-year-round load for our industry.

It cannot be too strongly urged upon consumers by salesmen that the object of refrigeration is primarily to preserve food *all the year round,* and not merely to make ice and keep butter from melting in our very few hot summer days. The proposition is in fact a 52 weeks' one and not a 2 weeks' one, for which a few blocks of bought ice are a satisfactory substitute.

In the average town house and flat to-day the larder is an integral part of the kitchen quarters, and therefore is seldom at a temperature below 50° Fahr., the only safe temperature at which to keep food for even 24 hours—especially milk and milk foods. In fact (now that harmful preservatives are forbidden by law), the temperature which suits the housewife in her daily work in the kitchen is just that which suits the germs of putrefaction and makes them thrive and multiply. It is well for salesmen to drive home the slogan devised by us to make the 50° line familiar to housewives and health workers—"Below the line safety, above the line danger," a slogan now adopted by many health and welfare instructors in their teaching on the care of food.

The Idea is New.

The refrigeration idea itself has yet to be sold in England, not merely the idea of refrigeration by gas or any other agent. The basic idea of refrigeration has to be put before the public, not merely the relative merits of Smith's or Brown's special model. This is the first and fundamental fact for gas salesmen to get into their heads before starting out to canvass.

Food in Bulk.

First we must consider food in bulk. Refrigeration for stores of food is absolutely necessary under modern conditions, unless we are to go back to the slow poison of preservatives, now happily forbidden. And the refrigeration must be primarily done for us all in the initial stages by the transport services and by the tradesmen who store our food in bulk—milkmen, butchers, cooked food purveyors, and caterers. These are, of course, the only refrigerating centres for the poor who buy their food in pennyworths, and who, alas, require no larder for any storage of superabundance.

Domestic Supplies.

The people with bigger purses, who buy larger supplies, should provide themselves with secondary and private cold storage in their own homes—namely, the modern domestic refrigerator, to be had in various sizes, which is the true domestic larder of to-day for perishables in house or flat.

The Cost.

Refrigeration is not only necessary but is economical. The refrigerator for the small house, costing (say) under £30 on a three years' purchase, would have to be very carelessly used not to save the housewife £10 a year in spoiled food, and to pay for its first cost by the time the instalments ceased. After that it would actually effect a money saving on food bills. There is no waste of uncooked foods and no dishing up of semi-tainted meat, or throwing away of remains of any sort where a refrigerator is part of the kitchen equipment and where it is intelligently used—used, that is, for *all perishables all the year round,* and not merely to make a few blocks of ice in the summer or iced sweets for odd festive occasions. The latter luxury use is an "extra" thrown in, and should never be made the chief basis of argument for purchase.

Gas for Cooking—Gas for Storage.

From the gas undertaking's point of view the gas-operated refrigerator is one more valuable and practical "assistant" to the gas cooker, just as is the gas water heater. From the point of view of the housewife the gas undertaking can provide her with the simplest and most economical appliance for cooking her food; and supplement it by an equally simple and economical appliance for storing her food hygienically and in safety both between purchase and cooking, and between one day and another after being cooked; an appliance, too, which will keep sweet and wholesome, almost indefinitely, such food as is to be served without sterilization or cooking. For example, medical tests were made in which fresh milk was still fresh at the end of a fortnight after being kept in a household refrigerator in the covered bottle in which it was delivered. Lastly, the home refrigerator will preserve fresh and crisp all salads and ripe fruit and even cut flowers that would wilt if left for hours in a warm dining room between meals. In fact, just as we have for years advocated the gas water heater as the indispensable right hand of the gas cooker in place of the obsolete coal-fired boiler, so now we can recommend the refrigerator as the equally indispensable left hand, in place of the old-fashioned town larder.

The Conservative Cook.

Of course, cooks, like other servants, are conservative. It is always difficult at first to get a modern labour-saving appliance adopted. Nobody knows that better than does the gas industry which spent so many years breaking down the attachment of the average cook and householder to the cumbersome and smoke producing kitchen range. But an educated housewife has only to do her own kitchen work for a few weeks to realize that the average larder leaves much to be desired from the point of view of health and cleanliness.

Creating Public Opinion.

The gas industry has done much health pioneering work in all other parts of the house from bedroom to bathroom, from dining room to scullery. It is now possible for them to modernize the larder in home, hotel, and hospital, as well as to improve still further the national larder—namely, the shops and stores where our food is guarded after it leaves the ship, field, or garden, until it is handed to us over the counter or delivered to us at our kitchen door.

As the industry has done much in the past towards saving human fatigue and reducing smoke and fog by the sale of cookers and fires, so is there in the future much good business and public service to be done in encouraging the hygienic preservation of food. It only remains for us to go out and get the business and thereby render the service.

Prepare Selling Campaigns Early.

And, just as the summer is the time to begin pushing gas fire sales, so the time to prepare for any early spring refrigerator campaign is in the previous winter. For "*If winter comes, can spring be far behind?*" Therefore, though the few blazing days of summer may be the best time to persuade the housewife to buy a refrigerator, our English heat waves are so short and so rare that it would be better for the salesman to depend on his own scientific and reasoned explanations and his own powers of persuasion than to trust to the sun to do his job for him. For, alas, by the time the sun has driven home the lesson during a few hot days, it is more than likely that a cold wet spell will have set in before the refrigerator can be fixed in the customer's house; and the housewife who is thinking in terms of iced drinks will merely be disgruntled.

For that reason, we wish to enforce what we said at the beginning of this article—namely, that the idea of refrigeration should be primarily related not to heat waves and blocks of ice, but to continuous food problems and the national health.

This line of approach involves, of course, patient education of the public along the lines being followed by Medical Officers and their assistants since the passing of the Food Preservation Act. But this method of appeal, if the slower way, is also the surer and saner way, as well as the more public spirited. In the long run, too, it will bring the best business, because it is supported by a growing volume of public sanitary and hygienic principle and practice.

GAS SERVICE - - -

Discussed from the viewpoint of the Gas Salesman.

Can You Afford to Do Without One?

A short time ago, when discussing the question of refrigeration with a gentleman concerned in the sale of gas refrigerators, the point was put to the writer that the problem which really presents itself is not whether one can afford to install this appliance, but whether one can afford to do without it. The problem is one which concerns the customer because his health may depend upon its solution, and the gas company because the refrigerator represents a steady load, and should be a cultivator of goodwill. There are some undertakings which have already appreciated the desirability of going out after this business, and on p. 354 of the "JOURNAL" for Aug. 13 last there was an indication of what can be accomplished, in the results attained in a sustained and enthusiastic campaign by the East Surrey Gas Company.

There is much work at hand in this field; for, as Mrs. M. A. Cloudesley Brereton, Editor and Consultant of the British Commercial Gas Association, tells us, "the refrigeration idea itself has yet to be sold in England." The article which she has been kind enough to contribute appears in this issue of the "JOURNAL;" and we commend it to the earnest consideration of those on the distribution side of the gas industry. It is a subject to which Mrs. Cloudesley Brereton has given particular attention; and some years ago she dealt fully with the question of refrigeration in a paper which she read before a body of medical people, at a Royal Sanitary Institute Congress.

Make a start at once (it is not merely a summer need) on inculcating the habit of refrigeration—by gas.

Gas Refrigeration Coming Into Its Own.

In view of Mrs. Cloudesley Brereton's article, it will come as interesting news that Messrs. Electrolux, Ltd., have during the past few days received an order from Messrs. Lyons & Co., Ltd., for 700 gas-operated "Electrolux" refrigerators for conserving ice cream. This is not the first order the firm have had of this type from Messrs. Lyons. They received a previous contract two years ago for 500 cabinets, all of which are working on gas in the shops of Messrs. Lyons' various agents in London and the home counties.

A Place in the Sun.

Dr. C. W. Saleeby, who is well known to our readers, has for years now been telling us how vital it is to take full advantage of the health-giving properties of the sun's rays. He has been giving us word pictures of sun-bathed Alpine resorts in which invalids quickly regain health, and of American industrial cities greatly improved not only in appearance but in the general health of their inhabitants, by the use of smokeless instead of smoke-creating fuels. That his ideal of smoke-free homes is a practical proposition and attainable "in our time" is illustrated by an interview with him in his London home, which forms the subject of the current issue (No. 199) of "A Thousand-and-One Uses for Gas," published by the British Commercial Gas Association. "You will have noticed," said Dr. Saleeby, "that in every living and bedroom throughout the house, other than the staff sitting room, I have gas fires. I have never used anything else since I came here 25 years ago." He has quite recently had each fire equipped with the new radiants which emit short infra-red rays which warm the blood without scorching the skin. The publication is illustrated by photographs of the interior and the exterior of Dr. Saleeby's house.

The Land of Magic Taps.

An attractive booklet has been prepared by the B.C.G.A. in which it is explained that to-day there are more than 9,600,000 gas consumers—that is to say, practically every family in an area of gas supply is using gas for some purpose. Truly, therefore, the British Isles is a land of magic taps—taps which are ready, day and night, to turn on clean, dependable heat for every household need. Examples of most gas appliances for domestic heating are illustrated and described in the booklet, in which is incorporated an excellent set of comparative costs of gas and electricity for various domestic purposes. Gas undertakings would be well advised to distribute this comparison among their consumers. Here it is:

ROOM WARMING.

Electricity.—For warming a room of normal size (say) 12 ft. by 12 ft., an electric fire of the correct size would cost under 4d. an hour when switched fully on. When two-thirds on, the cost for electricity would be just over 2½d. per hour.

Gas.—To provide exactly the same amount of heat in the room by means of a gas fire, the cost per hour for gas would be 2d. when the fire was full on. When only five of the nine radiants were in use the cost would be 1¼d. per hour. In addition to heating the room, the gas fire provides healthy ventilation.

LIGHTING.

Electricity.—You can light a room provided with two 60-watt electric lamps for 5 hours each day for a week (7 days) at a cost for electricity of 1s. 9d.

Gas.—You can light the same room by gas for the same length of time, giving equal candle power, at a cost of 10½d.

REFRIGERATION.

Electricity.—You can run a small electrically-operated refrigerator at a cost of 5½d. a 24-hour day for electricity.

Gas.—Run by gas the same refrigerator will cost you 2¾d. a day.

COOKING.

Electricity.—You can cook a meal (consisting of 2½ lb. of roast beef, two vegetables—cauliflower and 3 lb. potatoes—a rhubarb tart, and a milk pudding) for four people, on an electric cooker at a cost of 2·9d.

Gas.—You can cook exactly the same meal on a gas cooker at a cost of 1¾d.

WATER HEATING.

For baths and domestic purposes.

Electricity.—With an electric storage heater you can heat enough water to supply four hot baths daily, together with enough water to supply all kitchen needs for a family of four, (say) 66 gallons in all, at a cost of 2s. 1d.

Gas.—You can heat the same amount of water with a gas storage heater at a daily cost of 11d.

BOILING WATER.

Kettles.

Electricity.—You can boil a 4-pint kettle of water by electricity on an electric hotplate *in half an hour* for ¾d.

Gas.—You can boil the same amount of water by gas in *a quarter of an hour* for slightly under ¼d.

N.B.—The above figures are based on the assumption that:

(*a*) Gas costs 10d. per therm for all purposes.
(*b*) Electricity costs 5d. a unit for lighting.
(*c*) Electricity costs 1d. a unit for all other domestic purposes.
(*d*) Where water heating is concerned the initial temperature is always 50° Fahr.

Christmas Window Displays.

It may seem early to be thinking of Christmas, but a suitable window display for the "festive season" is something of a problem for gas undertakings. For one thing, there is not much business in the shape of buying of fires or cookers at that period; no one wants fitters in just then, and the gas undertaking becomes more or less dead for about ten days just at a time when most other shops are brilliant and at their best—at a time also when huge crowds are window gazing. Merely to decorate a window has little or no effect; there is not the compelling interest of present buying behind it. Possibly gas irons, silk shades, &c., do attract some Christmas shoppers, but your showroom is not packed out and busy like the neighbouring big stores and shops. As there is so little need for a display of ordinary goods, it is an opportunity to use the windows to advertise gas in general, and it is undoubtedly to the good to make a town talk about you.

Mr. Easten Lee, the window expert who writes for the "Gas Salesman," suggests in the current issue that the very fact that there is a lack of definitely "seasonable" goods can be turned to account by being different to anybody else and at the same time telling everybody that it is good to cook by gas. He suggests above all that a humorous display is called for at Christmas. Make the whole town laugh, he says, but be careful that they laugh with you, not *at* you.

Window Humour Must Not Be Subtle.

If you are inclined to try a humorous window, there are a few precautions which must be observed to ensure success. The humour must be at once apparent; it must proclaim without doubt that it is a joke. It must not be subtle but very broad, and it must in no circumstances be capable of giving offence to any susceptibilities. These considerations make humour in business advertising difficult, for if the subject is a good one it will make a whole town laugh, but if not carried out correctly contempt may be the result instead of fun.

The cost of such a display need not be great. If any member of the staff is an artist, it can be kept down to shillings, and even if given out it is not a costly matter. A simple enough design, with cut-out figures and home-made "props" is described in detail by Mr. Lee, and illustrated in the October issue of the "Salesman." It is a window he has tried, and he considers it one of his best purely publicity efforts, apart from selling windows or displays. There is no difficulty in staging it, he says. It is only a question of time to work out the details.

GAS AT THE NORTH LONDON EXHIBITION.

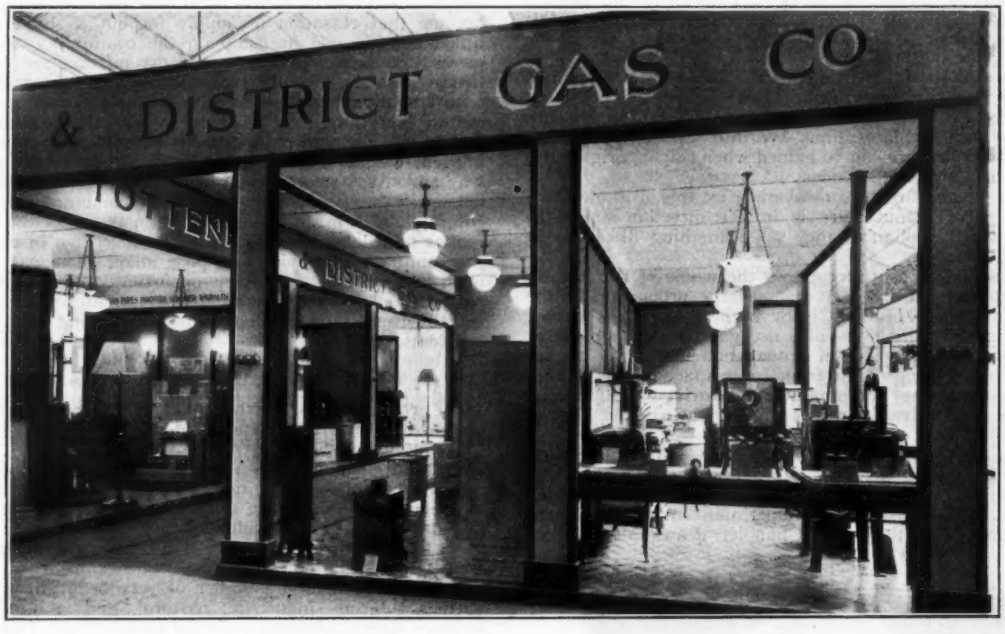
The Tottenham and District Gas Company, and several other well-known local firms, have much of interest at this popular Exhibition at the Alexandra Palace, Wood Green.

Gas once again plays an important part in the fifth annual North London Exhibition, held at the Alexandra Palace, Wood Green, and this year the Exhibition is larger and more comprehensive than ever before.

The Tottenham and District Gas Company's Display.

All the year round the Tottenham and District Gas Company's small kiosks stand one each side of the main entrance at the Alexandra Palace. On the one side is a model kitchen and on the other a series of gas fires and other appliances, together with sample bags of sulphate of ammonia. Opposite the main entrance—which, by the way, is lighted by a series of attractive gas fittings—was a block on the four sides of which were " Metro " coke fires in action, and these acted as " silent salesmen " and attracted very considerable attention.

The main stand of the Gas Company was a very fine one, set out on a much larger scale than at the previous Exhibitions. The stand, a very handsome structure, comprised three model lounges, with attractive gas appliances in suitable surrounds in each, a model kitchen section, a fully equipped bathroom, an industrial section, and extensive space for cookery, washing, and ironing demonstrations, which were carried on throughout the whole period that the Exhibition was open. The stand had a very lively appearance, every demonstration being attended by a large and appreciative audience. It was estimated that some 300 people attended these demonstrations each day, when eight special cookery demonstrations were held.



Our attention was particularly drawn to the very pleasing effect of the new slate (marbled and coloured) mantels and a new type of Davis gas fire designed very much on the lines suggested by the late Sir Lawrence Weaver; this represents a new phase in gas fire design and æsthetically and artistically goes some way to meet the requirements of the gas industry.

In that part of the stand fitted as a bathroom was installed a thermal storage water heater which the Company are now placing on the district, installing the apparatus, making all the connections and supplying the necessary gas at an inclusive charge of 6d. per day. A geyser also served the bath, and a Potterton combined apparatus and Ewart's " Vivo " multi-point were also displayed. The kitchen equipment comprised a gas-heated clothes airer and coke-boiler finished in mottled enamel, together with the usual high-grade gas cooker.

A note was struck in that section of the stand devoted to industrial appliances. In the Tottenham Company's district there are a large number of factories, and an industrial department has recently been set up to deal with this important aspect of gas service. There was a small furnace made in the distribution workshops of the Company which is part of an order for eight to replace electrically heated furnaces, experiments having been made at the consumer's request to determine whether the present electrical equipment should be replaced by gas. Gas furnaces are being installed, the fuel cost being reduced by 50 p.ct. In this respect the Company is doing very useful work.

The stand had on each of its four sides a gas-ignited coke fire. This was an exceptionally good piece of propaganda work, the fires not only presenting a very pleasing appearance, but serving to warm what might otherwise be a chilly spot in the Exhibition.

The lighting of the stand was by Sugg's " Bon Marché " lamps, distance controlled.

Messrs. Hobbs Wilson's Exhibit.

Messrs. Hobbs Wilson are an up-to-date firm of gas heating engineers, of 268, High Road, Wood Green, N. 22, and they carry out a considerable amount of contracting work in co-operation with the Tottenham and District Gas Company. On this stand there was to be found a comprehensive display of heating and sanitary appliances. Among the former was shown a good selection of " Ideal Domestic " boilers for hot water supply. The new vitreous enamel finish in which these boilers can now be supplied was extremely attractive, and at a moderately low price.

In addition, there were " Ideal Classic " boilers and radiators for central heating, and also the new model of the " Ideal Cookanheat " for cooking, hot water supply, and central heating. This is now provided with insulating jacket, lifting grate, and is quickly convertible from the closed position to give a large open fire. All " Ideal " boilers are, of course, designed for burning coke.

The " Latona " radiator was also exhibited on this stand. It is claimed that this appliance costs approximately ¼d. per hour to warm a room of 2000 c.ft. to a temperature of 65° to 70°. The " Kempton " coke fire, with gas ignition device, was to be seen in operation, and attracted very favourable attention.

The " Rayrad."

Another very interesting exhibit on this stand was the " Ideal Rayrad." This is the latest form of radiator to apply the principle of heating by low-temperature radiation, the construction taking the form of a plate made in sections, cast with a number of waterways, and connected together with right and

left-hand threaded internal nipples. Hot water or steam circulating through these waterways warms the " Rayrad " throughout by conduction. The surface temperature is somewhat lower than that of the circulating fluid, which fact provides an advantage, particularly in the case of steam heating, as the unhygienic effect of dust decomposition is entirely avoided. The apparatus can be fixed on either wall or ceiling, although it is obvious that the principle of its operation requires that the faces should be exposed as much as possible to the room interior.

The thermal rays which are emitted from the " Rayrad " are naturally much milder than those emitted by hotter sources, but they are emitted from a much greater area, and are therefore more effectively diffused throughout the room. In fact, the temperature of the air of a room warmed by the appliance, taken at various heights and at various distances from the walls, does not vary more than one or two degrees.

As it does not operate by directly warming the air, its effect cannot readily be judged by a thermometer, as in the case of convection appliances. The feeling of warmth is the same, and a person is equally or more comfortable in a room warmed by the " Rayrad," even though the thermometer records a lower air temperature than would be the case if the ordinary type of convection apparatus was used.

Messrs. G. L. Wilson & Co., Ltd.

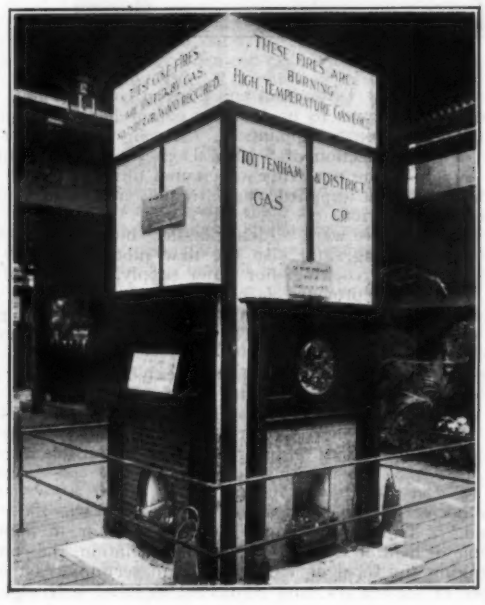
Messrs. G. L. Wilson & Co., Ltd., of Bruce Grove, Tottenham, and London, N. 17, had an interesting display of gas and coke burning appliances, among them the " C.C." coal-gas fire. This is a new and novel type of combined—or rather alternative—coal and gas fire, independent of each other in use, yet in one fitting. It is a convenient fire for early mornings, for the gas fire section can be lit first, and the coal fire later as and when desired, a cover merely being placed over the gas fire radiants. It is easy to clean out the ashes, as the gas fire section simply swings up, allowing easy access to the under part of the grate.

This firm also specialize in attractive coloured tile surrounds for gas fires, and some very beautiful effects are thus obtained. It is to make the fireplace more than just a place for the fire that these Wilson fireplaces aim. Warmth yes—economy, too; but what added pleasure can be gained when colour, originality, and beauty of design are included.

A number of gas fires are also made by this firm, while a further extensive manufacture is in the direction of wash-boilers, of which appliances they sell something like 2000 to 3000 a year.

Gas is used extensively throughout the whole of the Exhibition, and apart from the fact that a large proportion of the main lighting of the building is by high-pressure gas lamps, some twenty exhibiting firms also use gas for one purpose or another. An excellent piece of propaganda work was accomplished by the securing of the front cover space of the Exhibition Catalogue by the Tottenham and District Gas Company for a striking gas advertisement featuring " Gas—the Fuel of the Future."

Turning over the pages of this catalogue, it was gratifying to note an interesting article on the subject of " Gas in the Modern Home," by Mr. Samuel B. Chandler, M.Inst.Gas E., A.M.I.Mech.E., the Distribution Superintendent of the Tottenham Company. In this, Mr. Chandler draws attention to



the fact that in one form or another gas is utilized in practically every home in the land. For lighting, cooking, heating, hot water supply, refrigeration, ironing, or in some other way, town gas plays its part as one of the great public utility services in contributing to the comfort and convenience of the community, its influence in everyday life being most potently felt in the domestic sphere. So dependent upon gas have we become that cessation of supply for but a single day would inflict considerable hardship on the community and certainly prove the value of the service. Rosy pictures are painted of a future, says Mr. Chandler, when houses will be wholly equipped with labour-saving devices and when by the mere pressing of a button everything will be done for us. Unfortunately, these things are always in the future—in a Utopia to which, it is alleged, we are travelling, but from which we are still a long way off. As, however, the requirements of the practical young housewife are for a home for to-day and not for an elusive future, one is made to realize that gas meets the needs and makes such labour-saving homes possible now in every part of the country among rich and poor alike. The gas industry is most anxious to have every opportunity of rendering expert technical advice and service to the community, well knowing that it can assist the consumer in solving many domestic problems.

Art in Industry.

No article on this North London Exhibition would be complete without mention of the wonderful paintings of Mr. Herbert J. Finn, which were on public view in a special section set apart and curtained off—a quiet, restful spot away from the busy turmoil of the exhibition without. Here one could inspect at leisure these fine—one might almost say unique—examples of paintings of modern industrial subjects, which to those who have to view them every day may, until they have seen Mr. Finn's interpretation, perhaps consider uninspiring, not to say ugly. Among a large number of very beautiful paintings on various subjects—industrial, pastoral, and architectural—is a series of eleven paintings depicting scenes on the Tottenham and District Gas Company's works. The wealth of detail brought out in these paintings shows Mr. Finn as one who can fully appreciate the perfection of industrial plant and interpret the inner meaning of industry. These pictures of the Tottenham Works show interior views of the retort houses, with the sun streaming in through the windows and outlining the men at work, the exhausters, a coal truck being emptied by means of a tippler, the C.W.G. plant, washing and scrubbing plant, a general view of the works, and even a peep at the interior of the laboratory—all subjects which at first sound dull and uninteresting, until seen through Mr. Finn's eyes and communicated to the canvas—until is is realized what lovely colour, delicate shades, the play of light, and so on, are waiting to be discovered in these great industrial plants.

As Mr. Finn himself says, light and colour can mask much ugliness, if people are gifted to see their true values. The artist in this case has tried to combine a sensitive, unexaggerated feeling for colour that ranges through the most delicate tones to the highest reaches of flames. Art in industry, says Mr. Finn, is a big need, and truly applied, can harmonize us all to a higher sense of the right use of things. Art in industry is no longer make-up; the romance of it is all ready for the painter's brush. The idea of industrial paintings at this Exhibition was to try to educate the public to appreciate the beauty of their every-day surroundings, and to bring home to them what the great minds of industry are doing for them. There is nothing flamboyant in the big industries—nothing but heroic energy, atmosphere, real life—and therefore inspiration.

NEW COKE CHUTE

Mr. H. J. Toogood describes a new chute designed to fill, discharge, and completely empty coke storage bunkers, while preventing the formation of breeze and dust.

The modern sale of coke demands grading and more grading; and the process of grading entails an increase in the production of coke breeze and coke dust. Hence the profitable disposal of breeze is an ever-growing problem of the modern gas-works. Prevention being better than cure, it is obviously best to conserve the coke by eliminating as far as is practicable the wear-and-tear which is chiefly responsible for the breaking-down of the coke into its almost worthless components breeze and dust.

In coke screening and handling generally, every care is taken in the lay-out of the particular installation to prevent the large coke from being broken down into breeze. However, the coke having been graded, this care seems suddenly to cease, for there are no means in general practice for preventing or minimizing the wear-and-tear of the graded coke in its passage into, through, and out of, deep storage bunkers. The unwanted dust formed by breakage and attrition gravitates and accumulates in the lower corners of the bunkers, so that at some particular period, and when least expected, or when the bunkers are discharged more than usual, this accumulation of ultra-fines suddenly belches-forth and deposits itself in one consumer's consignment. Hence complaint and a dissatisfied customer.

Realizing what happens in a deep coke storage, there has been produced a chute of interesting construction which prevents or minimizes the wear-and-tear of the coke in its passage into, through, and out of, bunkerage.

Briefly, the chute is a spiral-side trough so disposed that:

(1) Its lower side functions as a path at a sufficient minimum inclination to the horizontal for the incoming coke to gravitate gently and with minimum breakage into the bunker.

(2) Its vertical back or the outer circumference of the spiral functions to utilize the centrifugal effect of the moving coke, to retain the descending coke on the inclined path.

(3) Its upper side functions as a cover to support the superimposed and stationary coke within the bunker, above the inclined path of the outgoing and descending coke.

(4) Its front, or open, side faces inwards to the vertical centre-line of the spiral and functions as an inlet and an outlet operative always at the free-surface of the coke within the bunker.

(5) The diameter of the development of the spiral is chosen such that, while the inclination to the horizontal of the outer circumference is approximately 37° (or just sufficient for the coke to descend gently by gravity), the inner edges of the open trough are much steeper—say, 70°. Thus are introduced the highly desirable features that the centrifugal force is necessary and is utilized to retain the incoming descending coke within the trough, and as soon as this ceases (*i.e.*, immediately the descending coke arrives at the free surface of the coke already in the bunker), the inner edges of the spiral trough being considerably steeper than the angle of repose of coke (approximately 45°), the coke hurriedly leaves the trough and distributes itself more uniformly at its natural angle of repose over the surface of the coke already in the bunker.

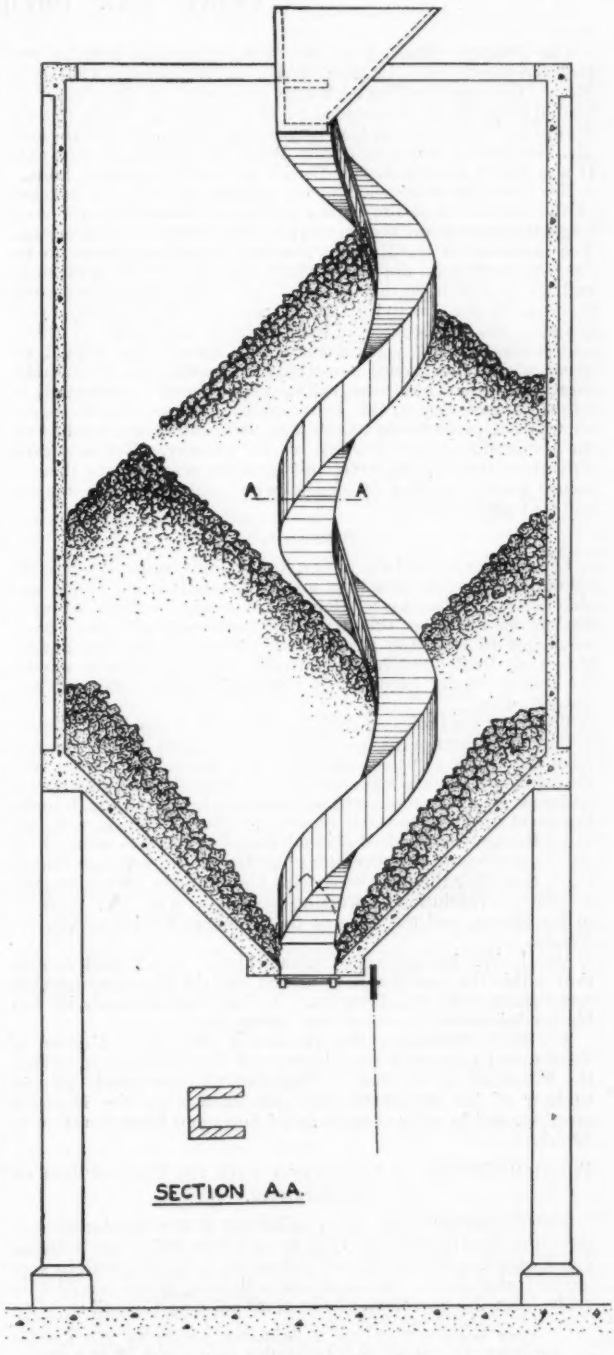
On the opening of the bottom outlet of any large bunker, a small quantity (or vortex) of coke immediately above the outlet always falls freely and without attrition. The ascertainment of the extent of this small zone or vortex is an element of the fullest success of the principle of this design of chute; consequently the extreme lower end is so placed that it terminates completely within the vortex, and yet is free from the bunker sides. There ensue the beneficial results that:

(1) The great bulk of the coke within the bunker is emptied without attrition, and before the coke resting directly on the cones of the bunker can move, owing to its being held by the superimposed weight of coke.

(2) Immediately the hopper is emptied to the particular angle of repose for coke, or coke which terminates in the nose of the chute, then automatically and in perfect sequence the residue-coke resting directly on the cones slips (without attrition) under the nose of the chute to empty the bunker completely of all coke, so that no old accumulation can mar the quality of the next consignment. Thus this chute offers no impediment whatever to the frequent complete emptying of the bunker.

The three-fold nature of the chute is made evident, for the incoming coke is more gently deposited, and is distributed more evenly over the whole surface of the coke already lying at the angle of repose in the bunker, whereby breakage is minimized and the grade maintained more uniform throughout the mass.

On loading coke into consumers' vehicles—the chute end being immediately over the discharging outlet of the bunker—a selective action is set up, for, while the body of the chute tends by its resistance to hold the bulk of the coke in the hopper stationary on the cones of the bunker, it provides a free way for the coke to flow gently, with minimum breakage or degradation, down within the chute's interior to the discharge outlet.



Thus attrition of the great bulk of the coke within the bunker is prevented, and the grade delivered with greater uniformity to each consumer's vehicle.

Lastly, the chute delivers its stream of coke so much more steadily than does the ordinary hopper outlet as to be better able to function as a feed to regulate the supply to a conveyor, whereby overloading of the conveyor is prevented.

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations ———

Eastern Counties Gas Managers' Association

COAL TAR PROBLEMS DISCUSSED

The Autumn Meeting of the Association was held in the Holborn Restaurant, London, W.C., on Wednesday, Oct. 15—Mr. A. GREGORY, of Harwich (the President), in the chair. A cordial welcome was extended to Mr. Harold E. Copp (President of the Institution of Gas Engineers), Dr. E. W. Smith, and Mr. Gardiner (Chairman of the Wisbech Lighting Company). It was stated that Sir Arthur Duckham would be present later.

Mr. COPP, in acknowledgment, pointed out that the success of the operations of the parent Institution depended in a very large measure upon the support of the District Associations. The members of the Eastern Counties Association were to be congratulated upon the paper which was about to be presented, and which was most opportune. The subject of tar concerned everyone in the gas industry. In fact, one could hardly overestimate the importance of the problem, especially to those undertakings using vertical retorts. There were difficulties about which they heard something at Leeds, but he thought these difficulties had been rather exaggerated. Although it might be necessary in the Antipodes to adopt certain methods, he was not prepared to admit that these difficulties applied to the tar production as a whole of this country. But whatever difficulties they might have, this was the way to face them—secure papers written by people who understand the subject and its complications.

SYMPATHY.

The PRESIDENT said the nation had recently suffered a terrible calamity in the valuable lives lost by the destruction of the airship R.191. The Association had, perhaps, a more intimate feeling as regarded this tragedy, inasmuch as they were privileged to view the R.101 while under construction during their visit to Bedford in May, 1928. They had also to mourn the loss of an old friend in Mr. Samuel Glover, who had just passed away.

The members indicated their sympathy by standing in silence.

The PRESIDENT went on to refer with regret to the absence from the meeting of their old friend and staunch supporter, Mr. Prentice, of Ipswich, who had passed through a serious illness and was, he understood, still in a nursing home, although making good progress towards recovery. The Secretary, with his usual thoughtfulness, had sent a letter of sympathy on behalf of the Association to Mr. Prentice; but Mr. Prentice would like to know that their thoughts were with him that day, and he begged to move a resolution expressing sympathy with Mr. Prentice in his illness, and the hope of the members for his speedy recovery.

Mr. J. W. AUCHTERLONIE (Cambridge), who seconded, said that within the past few days he had had the pleasure of seeing and talking with Mr. Prentice. He had been seriously ill, but his condition now appeared very favourable.

The HON. SECRETARY AND TREASURER (Mr. E. F. Keable, of Southtown) expressed the pleasure of the meeting at having the President in the chair. They had all been deeply grieved to hear of his dangerous condition soon after the Harwich meeting, and heartily congratulated him upon his restoration to health.

POLITICAL SUPPORT IN CONNECTION WITH THE DEVELOPMENT OF ELECTRICITY.

The SECRETARY went on to point out that a resolution was passed at the Harwich meeting, to be forwarded to the National Gas Council, with reference to Government propaganda in support of electricity. He read the following letter received in reply from the Secretary of the National Gas Council:

> Your letter setting out a resolution passed by the Eastern Counties Gas Managers' Association on the 16th of May, drawing attention to the opportunities taken by Members of the Government in urging the use of electricity on every possible occasion, has been considered by the Central Executive Board of the Council.
>
> I am requested by the Board to thank the members of your Association for the resolution, and for supporting the work which the Council is doing to ensure that fair play is meted out to the Gas Industry in this connection. Both the British Commercial Gas Association and the National Gas Council are giving particular attention to this matter. You will probably remember that Sir David Milne-Watson some time ago publicly challenged a statement made by the Minister of Transport in connection with this question, and quite recently a letter was sent jointly by the Secretary of the Institution of Gas Engineers and myself to the Minister of Health.
>
> The Council is of the opinion that at the present time the protection of the industry must be taken up in a more positive way by obtaining the removal of the legislative restrictions which were placed upon the industry as far back as 1847, and definite steps are now being taken to this end.

A RESIGNATION.

The SECRETARY also announced the receipt of a letter from the son of Mr. E. W. Smith, of Chelmsford, stating that the physical condition of his father rendered it impossible for him to take any further active interest in the Association. Therefore he resigned his seat on the Committee. No mention, however, was made of membership. On behalf of the members, he had sent a letter of sympathy to Mr. Smith, senior.

The resignation of so old a friend was accepted with very deep regret.

Thereafter Mr. F. N. Howes, Engineer and Manager, Chelmsford, and Mr. F. Bell, Manager, Kelvedon, were elected members of the Association; and there was a presentation of first-class certificates to Mr. J. E. Cooper, of Cleethorpes, and Mr. C. B. Staniforth, of Gorleston, gained in the recent Higher Grade Examination in "Gas Engineering."

SOME PROBLEMS AND SUGGESTIONS RELATING TO COAL TAR.

By W. J. CHADDER and H. M. SPIERS, M.A., B.Sc., F.I.C., of the Woodall-Duckham Companies.

[For Paper, see "JOURNAL" for Oct. 15, pp. 161-66.]

Mr. CHADDER, by whom the paper was submitted, prefaced his reading of it saying: The present state of the tar market calls for a determined policy from all concerned in the production and treatment of the raw material. The annual output of tar by the gas and coke oven concerns of this country is approximately 1,900,000 tons, of which some 900,000 tons is converted into road tar. The road tar market is by no means saturated. Some of our roads are being treated with imported bitumen, not because this is more suitable than properly prepared road tar, but often because the uniformity of quality of the bitumen supplied to the road engineer may be more readily depended upon. We urge that the producers of tar should do everything possible to improve and stabilize their output of crude tar, and take a more active interest in the preparation, and in the quality and sale, of the road tar.

The PRESIDENT expressed his personal thanks to Messrs. Chadder and Spiers for their paper, and asked Sir Arthur Duckham if he would be good enough to open the discussion.

Sir ARTHUR DUCKHAM said he had not come to the meeting with any idea of doing this. He realized that the paper provided a definite addition to tar knowledge. His Company had always felt that tar was an ideal substance for road purposes, and that it was wrong of this country to import material to put on the roads if they could supply that material themselves. They had also always recognized that the tar revenue of gas undertakings was of the utmost importance. They knew that tar from continuously working vertical retorts required more careful treatment for road purposes than horizontal tar. It was for this reason that the work referred to in the paper had been carried out, and with a very considerable amount of success. It seemed to him that the gas industry should be able to supply the need for road tar. They had been handicapped in the past, possibly by lack of understanding, and, on the other hand, they had been attacked by a material—bitumen—which had been backed by perhaps the strongest financial backing in this or any other country. If they could supply all the road material from gas-works tar, then the position of the gas-works balance-sheet would be very much better. Thus the work that had been done was important, and, as he had already said, it had certainly been successful, judging from the reports of the engi-

neers who had used the process and the surveyors who had used the material.

Results Open to All.

All he would like to say from the point of view of the Company which had done the work was that it had been carried out for the sake of the industry, and with the hope that all who were attached to the gas industry would profit thereby. The results of the work were open to all. They, as a Company, were delighted to assist in any way towards the getting of better road material from any kind of tar through any kind of plant. This service was available because they felt that, from the tar point of view, the gas industry should be far more prosperous than it was. Seeing the low price of tar to-day, it was evident that something should be done. He could not sit down without expressing his appreciation of the work done by Mr. Chadder and his colleague on the "T.I.C." plant. It was good and honest work, and he did not mind saying so, although he was Mr. Chadder's chief and therefore responsible for it.

Mr. Harold E. Copp said that had he been asked what he would consider to be the most suitable subject for a paper in the gas industry at the present moment, he would have named tar. They had just had a very valuable contribution to the rather sparse knowledge possessed by them as to the nature and use of tar. They did not want to emphasize their difficulties, but they did need to concentrate on some means for overcoming them. He had thought that the cause of road tar use in this country had been very seriously damaged by some people offering for road purposes tars which were utterly unsuitable—tars which had not been scientifically treated or which had not been properly prepared. ["Hear, hear."] In some parts of the country there was great difficulty in persuading surveyors that the gas industry had just the article to offer them that they wanted. Surveyors confronted them with the specifications of the Road Board, and, of course, they had to admit that there were difficulties in complying exactly with these specifications, although some of them had found out ways and means of doing so.

Need for Revision of the Specifications.

These specifications should have been made more elastic. More than once in recent times they had been told that the roads in Scotland were very much better than those in England. It was said that the former were more durable and far less liable to produce skidding As members were no doubt aware, the specification for tar was different South of the Tweed from what it was in the North. If they had the same specifications applicable to England as were applied in Scotland, it seemed to him that their difficulties would be removed. He could not understand why it was that what was good for the territory North of the Tweed could not be good for that in the South

Effects of Phenolic Acids.

There was one very desirable thing which he had in mind, and that was the control of the formation of phenolic acids. These had a tremendous bearing on the difficulties of distillation. He used exclusively pot stills, and the destruction of these stills was a very serious matter. It was formerly thought that this destructive effect was caused by chlorides, and this was a very easy way of explaining it; but, as a matter of fact, chlorides did not to any great extent affect the erosion of the interior of the stills. They had satisfied themselves that this erosion was due to one of the higher phenols. They knew that, if they eliminated certain phenols, this action did not take place. He suggested to the authors, who clearly possessed a very complete knowledge of the subject of tars, that if they could add some information in this direction they would be conferring a very great benefit on those who had difficulties in dealing with tars.

Two-Stage Dehydration.

Mr. T. V. Johns (Lowestoft) asked whether the authors had considered the possibility of two-stage tar dehydration. Owing to the more stringent specifications, it had become necessary to work at a higher temperature, and the value of the distillate was thereby decreased. The selling price of benzole was very much better than that of creosote. Distilling first up to (say) 150° and then to 260° would enable the distillates to be better separated.

The Work of All.

Dr. E. W. Smith remarked that the paper was a good one, and if all it did was to encourage others to place before the industry the work that was being done by them, it would have served a useful purpose. There was no subject connected with the gas industry that was more worthy of study than that of tar. For some years he personally had been trying to induce all those who handled tar to encourage the development of research. Most of the tar of the country was sold through the co-operative schemes. In principle, this ought to be the finest thing that the industry could have—co-operative handling of any of its products. But if one had to go on the evidence derivable from the general Press and the technical papers—the public evidence as to what developments were taking place in the matter of tar—one would say there had been no advance since the introduction of the co-operative schemes. Obviously there must have been research and developments, but they heard little or nothing of them. He could not help feeling that, as on the boards of these co-operative schemes gas engineers were in the majority, they had themselves to blame—if blame attached—as they could get anything done that they wished should be done. It ought not to be left to one company—either a gas company or a contracting company—to father such work as this, and he would again urge that the Institution of Gas Engineers or the National Gas Council should not just leave this matter to the co-operative tar associations or schemes, but that they should themselves supervise the research that could be carried out. Whether the work was done in the laboratories of gas companies or in central laboratories, the organizations he had mentioned should take on the responsibility of directing it.

Importance of Uniformity.

The most important point in the paper was that of uniformity. There had been a lot of discussion with surveyors and with Government officials, and they definitely agreed that the main reason for the bulk use of bitumen was that bitumen and its mixtures could be relied upon. Whether it was as good, or not quite so good, as tar did not matter in comparison with the fact that they could rely upon the product. It had already been remarked that there had been tars supplied which had let down the industry. There was no doubt of it, and he was not satisfied that these tars had been produced only by the small works, or by the works that were independent of the tar schemes. It was quite possible that bad, unreliable tar which had on occasions been let loose had come from sources which were in the most favourable position to supply and guarantee the best product. They knew that in the very large tar works making road tars and other products, there were residues which had to be got rid of; and if there were stricter scientific testing on the part of the surveyors, he was quite sure that this sort of thing would be eliminated. It was because the average surveyor went by results, rather than by testing, that he threw out any product that had ever let him down, and consequently bitumen was allowed to go forward. Possibly two of the most useful contributions that afternoon to the subject under discussion could be made by gentlemen who had had experience of the process; and he was hoping that Mr. Troughton and Mr. Green would address them. Quite recently he had met Mr. J. W. Napier, who had told him that he had been trying this suggested method of blending, and had obtained such results that, as Chairman of the Scottish road tar organization, he was very desirous that the great bulk of the tar in Scotland should be treated in this way. He had been asked what was the position with regard to the process—whether it was patented. The position was that his Company had worked out the process, and it was freely available to the industry. If they could give any assistance or advice in getting the process tried-out and used, they would be only too pleased to do so. He agreed with all that had been said about the unscientific basis of the specification. Scotland enjoyed greater latitude largely because it had insisted upon this greater latitude, and could not supply any road tar at all without it. Seeing that in this country so large a percentage of the tar was now vertical retort tar, it was up to them to see that such a specification was brought in as would give a perfectly satisfactory road material and at the same time enable them to dispose of their tar more readily.

Importance of Tar.

Mr. J. W. Auchterlonie (Cambridge) remarked that the tar he made was from horizontal retorts, and in answer to Mr. Johns he said that he did carry out his dehydration in two stages—175° in one still, and 225° in the second. They collected the oils in different receptacles, and sold them separately. This question of tar was certainly a most important one. It meant practically ½d. revenue for every therm of gas. In his own case, indeed, the receipts from tar were a little more than this. All honour to the Woodall-Duckham Company for their research work. It was something which the Institution ought to take up. He had been very interested in the paper which Mr. C. F. Broadhead, of Melbourne, had submitted to the last meeting of the Institution, and he did not think that that paper received the credit which it deserved. Much of the criticism that had been levelled against it was based on a false assumption. Mr. Broadhead had told them that the coal was not Australian, but South Yorkshire coal. He was not altogether in sympathy with Dr. Smith on one point. From an economical point of view, it was, he (the speaker) thought, wrong to have to send tar to one central place for treatment, and then to have to send it back for use, when they could produce what they required on the spot. This was only good for the railway companies. In his own case it was all used in the county, and this meant greater revenue to the Gas Company and less cost to the ratepayers. He hoped something would be done to further this research.

Dr. Smith said that he had not intended to convey the idea that he advocated co-operative distilling. It was the very antithesis of what he meant. Co-operative research, and not co-operative distilling, was what he had in mind.

Mr. Copp pointed out that the Institution of Gas Engineers had not lost sight of this subject, and only the previous day were considering it, and trying to establish some connection with the people who drew up the specification, in order that the Research Committee of the Institution might co-operate with them. ["Hear, hear."]

Experiences from Newmarket.

Mr. J. H. Troughton (Newmarket) remarked that, as some experiments which had been carried out at Newmarket had led to what he might term the fundamentals of this paper being built up, he would like to say that the system of blending tar had been attended by the happiest results. In the district round about Newmarket he thought he might say they had the best roads in the Kingdom, and the majority of them, at any rate, were tar sprayed. For many years he supplied tar for this purpose without any complaint at all, but that was horizontal tar. It was prepared by means of a Hird Chambers plant, which they put down during the war, and which did good service then and afterwards. Circumstances having altered, and having put down a vertical plant, however, he lost the local market altogether. Since adopting the "T.I.C." plant, he had regained his market in the county, for, during the past summer, the whole of his tar had been purchased. Vertical retort tar was in a different position from horizontal retort tar. Its character varied with coal size and conditions of carbonization, but they had had no difficulty in regard to blending the tar. With vertical retorts one got a larger quantity per ton of coal carbonized, but by blending a certain amount of the tar was lost, consequent upon the production of a greater quantity of oils. The volume was approximately two-thirds tar and one-third oils. But the oils, of course, were of

considerable value. He was getting as much for the oils as for the tar, so there was no loss there; but, at the same time, the adaptability of the "T.I.C." plant permitted one to get practically any tar required. Members would have appreciated from the paper that for the investigations carried out thanks were principally due to the Woodall-Duckham Company. Mr. Chadder spent many days at Newmarket, and did work which he trusted would benefit the gas industry. The paper should be an inspiration to others to continue the investigations. They were only on the fringe of what could be done in the way of providing a standard tar for the whole of the Kingdom. He regarded the present specification as by no means complete, and he had just heard that a new one was being drawn up. But with a complete system of blending, he felt sure that they were on the right road. Whatever a surveyor wanted, they could give him. He had with him the results of two tests, and both came out very close to what was shown in the paper. A bulk test proved that the tar complied in every respect with the British Standard Specification for a No. 1 Tar.

And from Wisbech.

Mr. J. Green said that, as Mr. Chadder had so kindly fallen in with his suggestion to prepare a paper, he would like to thank the authors for their valuable contribution, and he also wished to express his appreciation of the assistance so readily afforded him by the Woodall-Duckham Company in overcoming the difficulties that he had experienced when treating vertical retort tar for road purposes. Although he had a "T.I.C." plant installed, it was found impossible to produce a tar that would satisfy the local surveyor, owing to its lack of drying properties. On approaching Messrs. Woodall-Duckham, they readily gave him the benefit of their research work; and after re-designing the plant so as to introduce the blending process as described in the paper, they carried out practical tests which had resulted in his being able to dispose of all his tar to the local surveyor. He (Mr. Green) fully realized that with the small undertakings there was an increasing difficulty in producing a road tar that would meet the recent specifications; and he was with the authors when they stated that these specifications worked on the "hit-and-miss" principle, rather than on sound scientific lines, and tended to exclude much good material. He did not envy the present-day surveyor his responsibility for road making; and if they desired to do business with him in supplying the road covering, it was up to them to deliver the goods. There were still many surveyors who preferred the gas industry's product. As a motorist he believed that road-tarred surfaces were equal to the best, and he claimed that it was no idle boast for them as an industry to state that even in this department they could render a national service.

Mr. W. W. Townsend (Colchester) remarked that the gas industry as a whole was to be felicitated upon the public spirit of the Woodall-Duckham Company in carrying out the work they did in such a thorough fashion, and in so generously placing it at the disposal of everybody. The industry could not be too grateful to them for what they had done. It was very appropriate that this paper should have been read before the Eastern Counties Association. The Eastern Counties were singular in that the bulk of the tar produced was handled locally at the gas-works. They had no co-operative scheme, and thought it was in their own interests to keep outside; and he believed if the balance-sheets of the larger undertakings in the Eastern Counties were studied, it would be found that they made more from their tar products than any other part of the country. This was accomplished, too, by putting on the market, not an unsatisfactory material, but a material that complied with the specification, and was welcomed by surveyors. Even at a comparatively small works like Newmarket, with vertical retort tar of which so little was known, by co-operation between the gas undertaking and the Woodall-Duckham Company a process had been evolved which produced a material that complied with the specification and was entirely satisfactory. This was very important, because, as they had always felt in the Eastern Counties, the place where the tar should be distilled was at the gas-works, in the centre of the district where it was to be used. One of the greatest troubles he had had was corrosion of the tar still. Anything made of mild steel was eaten away very rapidly. Had the authors had any experience with preliminary distillation by means of steam, which he thought might possess great advantages—the distillation being carried to a certain point by superheated steam, and then taken on to its final point in an ordinary tar still?

Ascension Pipes at Both Ends.

He entirely agreed with the authors as to the advantages of fully charged horizontal retorts worked under level gauge conditions, and suggested that further improvement resulted if ascension pipes were used at both ends of the retorts. This had a very important bearing upon the quality of the tar and the stopped pipes—two things which went together. He had been working horizontals, without seals, and with level gauges, full charges, and pipes at both ends, and this had resulted in absence of stopped pipes and a reduction of the free carbon content of the tar.

Acidity in Stills.

Mr. Condrup said he was interested in Mr. Copp's experience of intensive corrosion of pot stills at a vapour temperature of about 250° C., and asked how it had been proved that the corrosion was definitely due to high-boiling tar acids; while these compounds were undoubtedly corrosive, it did happen that considerable amounts of hydrochloric acid gas were evolved at about this temperature from tars containing ammonium chloride, because this compound did not behave normally when heated above its dissociation point in the presence of tar. Ammonia was freely evolved early in the distillation, but the corresponding amount of hydrochloric acid appeared to remain in the tar, and was evolved at a later stage. This might explain many pot still corrosion experiences associated with creosote, and would be overcome by distilling off a proportionate amount of soda, or by changing to continuous distillation in a pipe still. In a still of this type the vapours evolved in the early stages remained in contact with the distilling tar, and hence acidity could not develop; moreover, pipe stills were more readily made from corrosion resisting material.

The pot still residue from a distillation in which acid had been generated would be resinified to a certain extent by the action of the free hydrochloric acid, and therefore would be harder than if no acidity had developed.

Mr. Townsend had referred to the advantages of using steam for the preparation of road tars. If by this was meant steam blowing as distinct from steam distillation, it was unlikely that steam would yield better results than would air; its control was more difficult, because the tar came to grade more sharply than if air was used, and it was doubtful if the tar would possess as low a degree of susceptibility to temperature changes.

The Corrosion Question.

Mr. C. R. Armitage (Norwich) said his experience, with horizontal retort tar, had been that he did not get much corrosion of stills in preparing road tar. The best still he had seen was made of the poorest iron he could lay his hand on. His experience with vertical retort tar for roads was the same as Mr. Copp's. He had not gone thoroughly into the matter, but he thought Mr. Copp had rather hit the nail on the head.

Mr. Copp remarked that the reason he came to the conclusion that this erosion was due to certain phenolic bodies was because he found them there to a very marked extent. He had tried metallization of the interior of the stills. The erosion took place not only in the tar area, but in the crown as well almost equally. Metallization with "Monel-metal" or "Armco" reduced it. To his mind, the trouble was due to a larger extent to certain phenolic acids than to chloride. With chloride the erosion was in grooves, where it ran down, but in the other case it was even erosion all over.

Mr. Chadder Replies.

Mr. Chadder said that his colleague would be very gratified, as he himself was, at the manner in which the members had received this paper. The question of corrosion was a very difficult one, but it was undoubtedly the fact that some of it took place because of the higher tar acids. At the Tar Conference held in Manchester in 1926, Messrs. Macleod, Chapman, and Wilson presented a paper in which they dealt with the tar acids problem, and included a table showing the effect of cresylic acid on various metals. But, in addition to the tar acids, there was no doubt that some corrosion was due to ammonium chloride. An interesting experiment could be tried by distilling in a flask some tar containing ammonium chloride. For the early part of the distillation the distillates would be alkaline. At a later stage the distillates became distinctly acid due to the presence of free hydrochloric acid vapour. His Company had tried to resist corrosion by the use of various rustless steels. In all cases they were superior to mild steel or "Armco" iron, but cost ruled out their use for large pieces of equipment. It was interesting here to note that corrosion was not confined to vertical retort tar. They had heard that afternoon of similar difficulties with horizontal retort tar.

It was quite possible that in many cases where engineers turned over to vertical retorts, they endeavoured to treat the tar in a manner similar to that customary with horizontal tar; but this did not do, and care must be taken to select a suitable process. The reduction in yield of road tar with the process under discussion probably was not more than 1 to 3 p.ct. in an average case. In other words, they recovered as a maximum about 3 p.ct. more tar oils. An ordinary standard plant could work the process with the addition only of one or more mixing tanks and a pump or air blower to prepare the blends. His Company had not done much work in connection with the steam distillation of tar.

It was not necessary to distil the tar in two stages in order to recover a more highly concentrated light oil. Any standard plant of the continuous type could be equipped with a fractionating column. All the vapours from the still could be conducted into this column, the head of which would be maintained at a temperature suitable for the recovery of any desired light oil, and the residual creosote would leave the bottom of the fractionator. Whether it was economical to split the oils in this manner was another question. If the oil were split into two fractions, one might possibly get less money for the two than for a combined distillate.

The authors were heartily thanked for the paper, on the proposition of Mr. Green, seconded by Mr. Troughton.

Office-Bearers.

On the proposition of Mr. P. D. Walmsley (Great Yarmouth), seconded by Mr. W. Grogono (London), Mr. Gregory was appointed to represent the Association on the Council of the Institution of Gas Engineers as from the June meeting, 1931; and the following officers were elected:

President.—Mr. J. Green, of Wisbech.

Vice-President.—Mr. P. D. Walmsley, of Great Yarmouth.

New Members of Committee.—Messrs. W. J. Mason, of St. Ives, and F. Young, of Skegness.

Auditors.—Messrs. G. A. Mallett, of Ipswich, and W. S. Venner, of Brentwood.

Hon. Secretary and Treasurer.—Mr. E. F. Keable, of Southtown.

Mr. Auchterlonie, proposing the election of Mr. Green as President, said he had been a member of the Association for a considerable number of years, and was Manager both of the gas-works and the water works at Wisbech. Not only was he

a capable engineer, but he had endeared himself to all by his charm of manner.

Mr. R. G. SHADBOLT (Birmingham) cordially seconded the proposition.

Mr. GREEN, in acknowledgment, remarked that it would not be possible for him to accept office without the co-operation and assistance of his Board. He was honoured by having with him that day his Chairman, Mr. Gardiner, on whose support he must rely if his year of office was to be a success. Mr. Gardner had come at great sacrifice of his time to extend to them a hearty invitation to visit Wisbech. [Applause.]

Mr. GARDINER said that, in the first place, he would like to add his thanks to the Woodall-Duckham Company for what they had done to improve the tar supplied in his own particular district. He had been very glad to find that this year they could supply a tar to the satisfaction of the County Surveyor, who was able to take all that they could make. He and his Company greatly appreciated the honour done to their Engineer and friend, Mr. Green. He was a man who had his heart in his work, and he rendered splendid service to the Company. They would be delighted if the Association would hold their spring meeting in Wisbech.

The PRESIDENT, on behalf of the Association, gratefully accepted the invitation.

INSTITUTION BENEVOLENT FUND.

The PRESIDENT said the members would have received a letter dealing with this matter, and he would like to take this opportunity of supporting Mr. Bennett's appeal on behalf of the Benevolent Fund of the Institution of Gas Engineers. At present the funds were not large enough to provide grants to the extent they would wish, and he asked those of the members who were not already subscribers to do what they could to remedy matters.

EDUCATION SCHEME.

The SECRETARY said he had twice circularized the members asking for guidance with reference to students in their employ who desired information or help in connection with the Education Scheme; but as a result of these efforts only nine members had replied at all, and in three of the towns represented by these replies classes were already in being. They were anxious to foster the Education Scheme, but obviously if the Committee had not before them the requirements of the various towns, they were unable to do so. He appealed once more for an intimation from those desirous of receiving assistance in this direction.

Institute of Fuel

PRESIDENTIAL ADDRESS OF SIR DAVID MILNE-WATSON, LL.D., D.L.

In the twelve months that have elapsed since I last had the honour of addressing you, the Institute of Fuel has exercised to the full the prerogative of the young, and has grown apace. Membership of all classes has increased by 35 p.ct. Two Provincial Sections have been established to meet the needs of members situated at a distance from the Capital. Both are in active being and have arranged a full syllabus for the coming Winter Session. The North-Western Section is situated at Manchester under the Chairmanship of Mr. R. A. Burrows, while the East Midland Section, under the Chairmanship of Mr. Eustace Mitton, will hold alternate meetings in Nottingham and Derby and possibly one in Bristol.

One of the most gratifying features of the new membership is the marked increase in the ranks of student members, of whom there are now 90. This has suggested the formation of a Students' Section, and efforts are being made to organize this branch of our activities. In future years keen competition should exist for possession of the Medal and Award intended by the Council to encourage the presentation of papers by our younger Associates. This year we have received contributions of excellent quality, but the number does not approach the figure we should like for active competition.

THE MELCHETT MEDAL.

As you will have noted from the preliminary announcements in the Journal of the Institute, our Founder President, Lord Melchett, has asked the Council to accept a capital sum to provide an Annual Medal for the recognition of either original research or professional, administrative, or constructive work of an outstanding character, involving the scientific preparation or use of fuel, provided the results of such work have been made available for the benefit of the community. This generous and thoughtful action adds to the long list of services which Lord Melchett has already performed for the benefit of the Institute, and deserves our warmest appreciation and gratitude.

It had been intended to make the first award at this meeting, but this has not been found possible to arrange. The first recipient has, however, been selected in the person of Dr. Kurt Rummel, Director of the world-renowned Warmstelle of Dusseldorf. Dr. Rummel will receive the Medal and deliver the Melchett Lecture on Jan. 23, 1931. It is, however, fitting that I should at this gathering briefly outline the reasons leading to his selection.

It was felt that the work which Dr. Rummel has carried out with such conspicuous success during the past 11 years not only fully entitled him to the award of this Medal, but its character is so similar to the objects and aims of our Institute that it is deserving of our earliest recognition. The work referred to, which is doubtless familiar to many of you, consisted first of the organization of better methods of control in German iron and steel works and the setting up of facilities for the interchange of experiences in and knowledge of developments made in iron and steel practice; secondly, of the initiation of research into the fundamental conditions controlling fuel consumption in metallurgical practice; and, finally, of investigations concerning the scientific co-ordination of the various operating departments and of their management and costing methods.

The results obtained from these efforts were of a most striking character. The special training of over 1000 fuel engineers was accomplished and they were drafted into the various undertakings to carry out and co-ordinate the work. In a very few years the effects of Dr. Rummel's efforts bore fruit in the shape of a remarkable saving of fuel, amounting to no less than 15 p.ct. of the fuel used per ton of the finished product over the whole German iron and steel industry. We shall, therefore, I feel sure, look forward with the greatest pleasure to Dr. Rummel's visit at an early date and to the opportunity of honouring one whose activities and interests are so thoroughly identified with our own.

A BUILDING FOR THE INSTITUTE.

You may have noticed in a recent issue of "The Times" a proposal to erect a building to house some ten Technological Institutions, of which this is one, together with the National bodies concerned with Iron and Steel, Mining, and Chemical Manufacture. The list of Institutions covers a wide range and includes fuel, metallurgy, chemistry, rubber, and petroleum. One of the most valuable features of this combined effort will be the merging of the libraries at present possessed by the various Societies into one of 70,000 volumes. The worth of this to students and workers in the various industries represented is one upon which I need not enlarge before a gathering of technologists. After a full consideration of the various benefits to be obtained, your Council were of opinion that it would be to the advantage of the Institute to co-operate with the other bodies I have indicated.

Next month H.R.H. the Prince of Wales has graciously agreed to make an appeal at a Dinner to be held at the Guildhall for the additional money required to complete the building fund, to which a large sum has already been contributed. The members of this Institute will, I feel sure, do their utmost to secure the success of a scheme which is expected to be most helpful to the future of the Institute.

The papers and discussions which have constituted our programme in the past year have, without exception, been of a high standard and have contributed notably to the art and practice of fuel technology. The practice which has been adopted on occasion of holding joint meetings with other Institutions is one that can be commended as saving much of the time of technicians and also as tending to broaden the basis of discussion. The ramifications of fuel utilization are such that the co-operation of ourselves with other Institutions is mutually advantageous and, therefore, highly desirable. I look forward to further extension of the practice in the future, and I see in the proposed new building increased opportunities of furthering these ideas.

THE WORLD POWER CONFERENCE.

Reference to technical subjects naturally brings me to make some mention of the World Power Conference which was held at Berlin in June last. I was privileged to attend this Conference in an official capacity, and I was much impressed by the cordial welcome extended by our German colleagues in industry. The Conference itself was well supported and the detailed organization of the series of gatherings, as well as the solution of the language problem, was masterly in conception and operation.

I was particularly pleased to find that, of the British contribution to the 400 papers presented, no less than one-third had

been prepared by members of this Institute. To attempt to describe the work done at the Conference would be out of place on this occasion. I would like, however, to direct your attention to the admirable symposium of views, collected from our members and others by the Secretary, dealing with various aspects of the papers presented and the discussions thereon, which appears in the current issue of our Journal.

The very vastness of such a Conference as this precludes an accurate estimate of its benefits until the lapse of time. It is certain, however, that the personal contact of responsible technicians from the important nations of the world, the consideration of common problems, the increase in the stock of common knowledge, and the discussion of matters which are fundamental to many industries cannot but be of the greatest benefit, not only to industry but to civilization. The display of German developments in engineering and chemical technology which was available in the tours following the technical meetings was illuminating in disclosing the efforts made by Germany to reduce her costs of production and to secure wider markets for her products, by the intensive and ordered application of science to industry.

Another advantage of such a Conference as this is that we have a great mine of information into which it will be possible to dig in the future as occasion demands.

Growth of the Use of Gas.

I daresay you will not regard it as unnatural, being, as I am, closely connected with the gas industry, that I was particularly interested in the following paragraph in one of the General Reports of the Berlin Conference.

> The total impression the papers convey is that of extremely active development of the gas industry pursued with the greatest zeal. The different kinds of gas, such as coal gas, natural gas, carburetted water gas, oil gas, and producer gas in particular, are winning greater and more extensive markets in countries where production of particular gases can be facilitated. The transfer from solid fuel to gas is in full blast, not only in the household and public buildings, but in a large number of industries, every branch of which is the subject of special studies in gas utilization. The advance in civilization which gas makes possible by counteracting the extremely troublesome smoke and soot nuisance and the enormous losses caused thereby is a point of view which, together with the economy of gas consumption, is brought to the fore.

The reporter also drew attention to the great extension of long-distance transmission of gas in the United States and the setting-up of gas distributing networks in Germany and other European countries.

The Area Gas Inquiry Report.

When we come to our own country, you will no doubt have noticed the Report of the Area Gas Supply Committee issued this summer. This Committee was charged with the investigation of the possibilities of transmission schemes for the linking up of coke ovens and gas-works in a particular belt of the Industrial North. The investigation proved to be one that was complex and lengthy. The Report indicates that the difference in the circumstances of gas supply, the distribution of population, and the location of coke ovens in this country compared with, say, Germany, preclude any general principle being laid down concerning the setting up of gas networks. Each scheme must be examined on its merits; and it is noteworthy that in the Area examined the Committee were only able to recommend a scheme in one division out of the three considered. It is pleasing to be able to record that steps to translate this recommendation of the Committee into being by seeking the necessary Parliamentary powers have already been taken. We trust that all parties concerned will be able to co-operate satisfactorily in this interesting development. On the general question of gas supply, the Committee not only recognize the desire of industry for cheap gas, but support the gas industry in its demands for greater freedom of action, and for the opportunity to introduce tariff systems of charge which will take into account the nature of the demand made by various classes of consumer, and it is earnestly to be hoped that the Government will be able to pass legislation this coming Session to give effect to their recommendations. The Report foresees the possibility of a considerable extension in the use of gas for industrial purposes. Estimates which were made indicated that in the area of the grid scheme proposed by the Committee great opportunities existed for the replacement of individual gas producer plants by a supply of cheap gas from the grid.

Even under existing conditions the use of gas in industry is extending rapidly in competition with fuels cheaper per unit of heat, in consequence of the constant quality, ease of control, cleanliness, and reduction of wasted products.

It is, of course, well known to you all that there has been a striking expansion in the sales of electricity year by year, which indicates steady advance in this country towards the efficient use of power and increased mechanization, but I am sure that it is not so fully appreciated that this has been accompanied by increasing demands for more efficient methods of heating. The extent of this can be realized by noting that the annual increase in the quantity of gas sold, converted to a common basis of heating value, has been consistently maintained at nearly twice that of the corresponding increase in the sales of public electricity.

Gas-Works to Use More Coal.

Although the production of gas has shown a regular growth in Great Britain for many years, the coal consumption of the industry has remained at a steady figure of approximately 18 million tons for some years past. The increased yield of gas has been provided from coal carbonizing plants, and not to any serious extent from any increased water gas manufacture. The production of coal gas from one ton of coal has been raised from 12,700 c.ft. in 1922 to 14,250 c.ft. in 1929. The progressive increase in the yield is naturally not now so great as it was, seeing that the older plants have been superseded by newer and more efficient units; and it is unlikely that any material increase in this direction can be secured in the near future. We may, therefore, reasonably expect an increased demand for coal by the gas industry proportionate to the increase in the demand for gas.

Consumption of Coke Increasing.

Any increase in the consumption of coal for carbonization will normally result in an increase in the production of coke. Last year I pointed out that the principle obstacle impeding the free co-operation of the gas and coke oven industries was the question of coke production. The Area Gas Supply Committee found this to be the case, and devoted much time and attention to a consideration of the various coke markets. They realized that neither industry had any monopoly in the domestic and industrial coke market and that the success of either was dependent upon their ability to supply the particular needs of the public. They recommended, however, that the two industries should set up some form of co-operation. This has already been done to a certain extent by the formation of joint committees dealing with gas and bye-products. Two of the most important observations made by the Committee were first concerning the domestic market:

> The tendency of modern thought is to reduce the use of raw coal. The extended use of coke would go far towards a reduction in the smoke nuisance. Evidence has been put before us that with a proper preparation and grading of coke and a well-designed sales campaign there is a domestic market which can be reached even including the use of coke in open grates;

and second, referring to the production of metallurgical coke:

> It has been put to us in evidence that as a result of the establishment of central coking plants of large size (in substitution for existing plant and with no overall increase in coke production) the cost (of coke) would be reduced by about 2s. 6d. per ton. It has further been put to us that the clean and uniform coke that should be produced by these larger plants would result in savings in practically all stages of iron and steel manufacture. Such savings would be of great importance to the iron and steel industry in its fight for markets.

It is satisfactory to note that last year over 10 million tons of coke were sold in the home domestic and industrial markets, and an approximately equal amount was used in the manufacture of iron and steel, and it is hoped that in the near future this will be largely increased.

Improved Coke Quality.

The growth in the domestic and industrial demand for coke averaging for some years 250,000 tons annually and which reached 400,000 tons last year has undoubtedly been fostered by the greater attention given to the production of coke by the carbonization industries. The accurate sizing and cleaning of the coke is becoming standard practice, while much work is being done for the purpose of also improving the quality by the preparation of the coal charge by crushing, blending, and the admixture of coke breeze, non-coking coals and even low-temperature cokes.

If I may introduce a figure from my own Company's experience in illustration, I may say that the Gas Light and Coke Company, who produce for sale something like one million tons of coke annually have spent over £400,000 on improved coke preparation plants in three years.

Future of Smokeless Fuel.

No mention of coke as a domestic fuel would be complete without reference to the cokes produced by low-temperature carbonization. There is undoubtedly a market for these easily combustible cokes, the limit of which is not at present known. As you may remember, the Gas Light and Coke Company in the past two years has given the closest attention to an attempted commercial development of several systems of low-temperature working. A number of processes have also been operated in other parts of the country; and although I should

not like to claim that finality has been reached, I think it can safely be said that technically the successful treatment of coal by low-temperature processes is now thoroughly understood. The main arguments put forward by the advocates of this treatment of coal are the desirability of having a supply of smokeless fuel and a source of home produced oils.

On the financial side, the happy ending is not, I fear, yet in sight. It is conceivable that those plants which are situated in a geographical position so as to secure a good-quality slack at low prices and can command a good price for the coke produced will show a profit upon their operations. In those parts of the country at a distance from the coalfields the difference in the price that has to be paid for coal and that received from the sale of coke and gas does not appear to provide a sufficient margin to meet even operating expenses. Both the coke fuel and the rich gas of externally heated systems can at present be marketed without difficulty. The oils, however, have so far proved most disappointing in quality and their return, as with ammonia products, is negligible in assisting the costs of the treatment of the coal.

It is to be hoped that in the perfecting of either a cracking or hydrogenating process a means may be found for rendering these oils suitable and efficient substitutes for imported natural oils and thereby improving their value.

Until this can be successfully achieved commercially and the consumer of solid smokeless fuel has to pay no more than his air-polluting, coal-burning neighbour, I can see no hopeful future for any low-temperature process whose sole or at least principal aim is the production of a domestic fuel superior to coal. The question of improving low-grade coals by low-temperature carbonization, especially in the countries where there is no good coal, is quite another question.

I incline to the view that the smokeless fuel of the future, which will sell on its superiority to raw coal, will have to be a high-temperature coke evolved by the researches now in active progress from the carbonization of selected, prepared, and blended coal.

The Carbonizing Industries and Home-Produced Oils.

The proper organization of the carbonizing industries can do much to provide a regular source of home-produced oils which would be of the utmost national value. The production of oil in any carbonizing process is inevitable. These oils, however, have various physical properties which are determined by the particular process of carbonizing which is employed. What is particularly required at the present time is that the processes should be modified so as to produce oils which, after treatment, would be suitable for the replacement of the natural oils. In the past too much attention has been given to the production of what is vaguely called " oils " rather than to specific oils. If one assumes a production of three gallons of motor spirit and ten gallons of other oils per ton of coal as representing a maximum production, it will be seen that the present carbonizing processes could produce 12 p.ct. of the motor spirit, and, say, 25 p.ct. of the remaining oils imported into the country. It is a matter for congratulation that the Admiralty have definitely taken steps to make purchases and trials of various home-produced oils, and similar steps by other large users are eminently desirable.

Public versus Private Electricity Generation.

The development of the National Electricity Scheme has naturally resulted in this aspect of our national fuel utilization receiving a considerable amount of attention. The work already accomplished has been accompanied by a remarkable and creditable fall in the consumption of coal per unit generated. Due, however, in part to thermodynamical limitations, which equally affect the conversion of the energy in coal to other forms by the medium of steam, and in part to losses in the transmission of energy, the actual proportion of the heat in the coal consumed received by the user is still not much, if at all, greater than 10 p.ct. over the whole country. I would direct your attention once again to the remarks I addressed to you last year concerning the private production of power, which, when equally efficient in respect of generation, eliminates the losses due to transmission. On the other hand, when equal efficiency in generation is unattainable, even with application of modern methods, it is certainly desirable that these privately-owned power plants should be replaced by the cheaper supplies of standardized power now at hand.

Co-operation of Gas and Electricity.

I am aware that much of the coal used for both the private and public electricity generation is not of a kind amenable to carbonization. The experiment, however, in one large power station of carbonizing the fuel before combustion is not only being continued, but extended. There must be numerous other instances where coked fuels could be employed with advantage both to the nation and to the respective undertakings. In London practically the whole of the coke breeze manufactured by the Gas Light and Coke Company is absorbed for the generation of steam, and at least 100,000 tons annually is used by electric power stations. Members who took part in the recent visit to the London Power Stations will have seen one of the stations which is using coke breeze in considerable proportions. I look forward to an extension of this co-operation.

While referring to the co-operation of gas and electricity production, I might add that the future development of both industries must tend to co-operation in the marketing of their wares, as is indeed already largely the custom in America. The salesman of to-day in the gas industry has already become a fuel technologist as a result of having, in advising consumers, to differentiate between gas, coke, and other forms of smokeless fuel, according to their particular merits for any specific duty required. It does not require a great stretch of the imagination to assume an extension of the activities of such a corps of technologists to include electricity as another agent. So many of the proper uses of each of these forms of prepared energy are so clearly defined that such co-operation would lead to greater efficiency by avoiding sales at unremunerative prices in order to secure business, and would give the consumer better satisfaction with regard to his demands.

During the year plants for the generation of electricity from water power in Ireland and Scotland have been put to work, and more recently some interest has been aroused by an arrangement of thermal accumulation in connection with a scheme to harness the tides of the Severn. These schemes are of great interest, but it is unlikely that such methods of generation will ever seriously affect the normal production of electricity by means of coal in these islands.

Fuel and Power in Other Countries.

The study of fuel production and utilization problems of other countries is one that is of great importance. The particular solution of any individual country's problem, however, must have as the basis those natural fuel resources with which it is endowed. Thus we find that mountainous countries such as Norway, Sweden, and Switzerland have largely developed water power, and at the same time are critical of the quality of the fuel they have to import, and are then careful to secure the highest efficiency in its uses. Germany, with bituminous coal and large deposits of brown coal, is engaged in the linking up of these deposits by gas mains and electric cables so as to make the maximum use of them without expensive transport costs, to avoid the importing of foreign gas coals, and by organizing fuel control to secure the best use of her natural resources. The United States, in addition to water power, has a wealth of coal, both bituminous and anthracite, oil, and natural gas. All of these are now very actively developed, the recent increased sales of natural gas being particularly remarkable.

British Coal the Nation's Cure for Depression.

Coming to our own country, one finds that oil, brown coal, and natural gas are practically non-existent, that the possible supplies of power from water are negligible in proportion to the nation's needs, and that we are left only with our deposits of coal. Ours is, then, a coal country.

Fortunately this coal is generally of high quality. Not very long ago, indeed, it could claim to be the best in Europe. Competition, however, has forced the other coal producing nations to devote so much attention to the preparation of the mined product before sale that the initial inferiority compared with British coal has been much diminished.

In the midst of the present world depression in trade it behoves us to consider whether the remedies proposed almost daily to restore our own trade are not sometimes on wrong lines. For a century past the coal resources of the country have been the foundation of its prosperity. The export coal trade has paid for imports, while the availability of cheap coal in the past encouraged the mechanization of industry and conduced to low costs of production. These were the causes which brought world-wide use and fame to British goods. To-day, as in the past, our success as a manufacturing nation must be based on coal and not on oil or water. Coal is the main source of electricity, gas, and steam, and, therefore, is all-important. In other words, it is upon coal that we must continue to depend for our national prosperity.

In its prosperous years the coal industry received little credit for the part it played in bringing about national prosperity; to-day, when it has encountered misfortune, it receives little but abuse.

Following upon a sequence of lean years consequent upon economic influences and internal dissension, the industry has given evidence during the past two years of making some progress. In 1929 the output exceeded that of the previous year by no less than 20 million tons. This increased turnout was absorbed in equal parts at home and abroad. The home increase was due partly to improvement in the iron and steel trades, but I think it would be fair to give a considerable amount of the credit for both the home and export trade increases to the adoption of improved and more elaborate methods for cleaning, grading, and otherwise preparing suitable coal for the various markets. Considerable progress has been made in the mechanization of the mines, in improved methods of coal mining; and these in conjunction with the increased output were beginning to place the financial condition of the industry on a favourable, if not yet prosperous, basis. Movements to

secure amalgamation in suitable conditions and for joint marketing were being established.

The Coal Bill.

In the midst of this promising state of affairs the Government, for reasons of political expediency, decided to introduce a Bill which has now become law. It is an Act with some objectionable potentialities not only as affecting the coal industry directly, but also the great body of fuel users and particularly those public utility undertakings, such as gas, electricity, and railways, whose operations so intimately affect the public and whose actions are often predetermined by Statute. It seemed strange to many of us to pass an Act for the express purpose of raising the price of coal to industry when cheap fuel is the chief desideratum of the times.

As I am personally responsible for the purchase of about three million tons of coal annually, and also as the representative of the gas industry which uses nearly 18 million tons annually, I felt it my duty to take some part in the opposition to this proposal, which I considered was primarily devised to benefit a small section of the population irrespective of national interests. Some important modifications were introduced, but the general form of the Act was but little changed in its passage through Parliament.

Economic laws may, however, prove superior to Acts of Parliament in a case such as this; and it may have the undesirable result of driving people to the use of oil. And if, as anticipated, prices of coal increase, then the user will become increasingly interested in economy and the quantity of coal used may be decreased, which is exactly the opposite result of that desired.

One can only hope that sound British common sense will be used in the application of the provisions of the Act so as to encourage the effective rationalization of the industry by the closing of uneconomic and worked-out pits, the acceleration of amalgamations, the reduction of distribution costs, and similar measures.

It is highly desirable that coal should everywhere come into line with other products of the day, and, although a variable natural substance, be subjected to such treatment before marketing as will ensure the maximum of value and satisfaction to the purchaser. Given this condition the question of price may become a less important consideration. Already British coal has secured again some of the old markets that had been lost in competition with Polish coal. I am convinced that with the export of the proper product no subsidization by home buyers will be needed to increase trade, other than such reduction of costs of getting, as may be expected to follow the increasing mechanization of the mines, and other progressive measures already in hand.

A National Fuel Policy Wanted.

The supply of heat, light, and power are such essential services in our modern civilization, whether in the home or industry, that any threatened increase in their cost should give rise to the keenest endeavour to counterbalance such an evil.

In the home any rise in the cost of these services must reduce the standard of living, while in industry the effect on the costs of production is so intimate that the slightest increase will inevitably react to our disadvantage in maintaining, much less increasing, our share of the world's trade.

Now, more than at any time, it is necessary to take active steps to produce a properly co-ordinated national fuel policy, not only to embrace the provision of energy for home uses, but to secure the highest standard of quality in British coal and coke exported. It must always be kept in mind that coal, and coal alone, is the foundation of such a policy, and that coal and its derivatives alone can secure the nation's prosperity in this direction.

I wish to make it clear that in stressing the importance of coal, I am in no way inimical to oil or water power. These have their place, and in the case of oil there are uses in this country which it alone can fulfil; but I wish to impress upon you that Great Britain is a coal country, that coal is our only native source of power, whether steam, gas, or electricity, and that it is all important that it should be used to the best possible advantage. Other countries have their native sources of energy—Norway, Sweden, and Switzerland, water; Rumania, oil—but we have coal only.

Importance of Clean Coal.

Such a policy would aim at a higher standard of freedom of the coal from undesirable ash than is at present recognized, coupled with grading of size and selection of quality. The removal of the ash is daily becoming of greater importance not only on account of the probable increase in foreign matter following upon the extension of mechanical methods of mining, but of the necessity of avoiding waste in costs subsequently incurred on account of transport, maintenance of furnace efficiency, clinker removal, ash disposal, and, as recent work has shown, in connection with the discharge of this portion of the ash into the atmosphere as dust. It is always well to remind ourselves that in this country something like 3 million tons of ash annually is unnecessarily transported from the mines to the user, fed to furnaces or grates, clinkered, and again removed and transported to some waste dump. The cleaning of coal would at once enhance the value of many of the smaller grades and extend their field of use. Even the export trade, which was founded on large coal on account of the lower ash content, is yearly absorbing more and more the smaller sizes as cleaning processes are being extended.

Selling Coal to Specification.

The combined result of cleaning, grading, and selecting opens the door at once for the sale of coal to guaranteed specification. This form of purchase is one that is steadily increasing. The publication of the British Engineering Standards Association Draft Specifications for Analyses and Sampling Inland and Export Coals should direct attention towards and help forward the provision of the purchase of coal of regular and standardized quality.

The transport of the energy contained in coal, whether in the form of coal, gas, or electricity, needs to be examined in order to deliver the energy from the mining areas to the point of use at a minimum cost.

So, too, the question of the value of prepared fuels, &c., should be investigated from the widest point of view. The National Electricity Scheme is dealing thoroughly with one aspect. The Area Gas Supply Committee has recently examined a particular instance of another aspect. But what is needed is a considered plan for the purpose of co-ordinating and extending the activities of the carbonizing industries with the proper linkage to electricity development. This plan would take into account the production of hydrogen and other gases from surplus coal gas in slack periods, and the home production of oils and motor spirit.

Domestic Fuel and Smoke Abatement.

An extension of the smoke abatement regulations applied to industry might well be made to cover also the domestic use of fuel. A cleaner atmosphere would result not only in improved health to the community, but also would obviate the expense now unnecessarily incurred in making good the damage done by dirt resulting from uncontrolled combustion. This damage is at the present time a not inconsiderable drain on the resources of the country.

A proper fuel policy would include the education of consumers in the right use of the various forms of energy. I am not at all sure that manufacturers to-day are taking the maximum advantage of the facilities already available for their use which are offered by the public utility companies.

Fuel Technologists Needed.

It is evident that at every stage in progress along the lines I have indicated there will be a need for fuel technologists, and that only those well versed in the various methods of extracting to the best advantage the potential energy contained in our greatest national asset will be competent to devise and secure the co-ordination I have in mind.

The Institute of Fuel comprises the men qualified in every respect for this work, and I do urge you to use your qualifications both individually and collectively so that the difficulties which at present surround our country may be alleviated by a really far-seeing coal utilization policy.

Coke Breeze

A Paper by Dr. E. W. Smith, C.B.E., F.I.C., M.I.Chem.E., before the Institute of Fuel.

It is a matter of national importance that fuel users should be kept fully informed as to the uses of coke in heating processes—whether domestic or industrial. During the last ten years coke has gradually tended to "come into its own," and is now accepted as a very useful and almost necessary solid smokeless fuel. Much more still requires to be done before its full possibilities are entirely utilized. It is of national importance for a number of reasons—the most outstanding of which is that of smoke abatement. If smoke could be eliminated from domestic and industrial chimneys, the beneficial results that would accrue would far exceed any that could come from any other single change in our national life. The general health of the community would materially improve, happiness would increase, there would be greater virility, longer life, less waste of coal, energy, time, and wealth. There would be an improvement in the output of the individual, both physical and mental, in all directions, and life would feel to be more worth while.

But apart from smoke abatement, coke is an important product of one of our leading national services—the gas industry. Over 95 p.ct. of the homes in England use gas for one purpose or another. This gas is displacing coal for cooking, water heating, and room warming, and a cleaner atmosphere is the result. But there would be a very great expansion in the use of gas if it were still cheaper, and no single product affects the price of gas more than coke. The greater the demand for coke the lower will be the price of gas. It is important, therefore, that everything should be done that can be done to improve still further the quality of coke and extend its uses in all directions as a substitute for coal.

If all coke were reasonably low in ash, low in moisture, and suitably graded, and if technically informed selling organizations were to be inaugurated on an ample scale, then the demand for coke would be insistent and imperative. The potential market for coke is enormous. Over forty million tons of coal are used solely for domestic heating, and a further forty millions are used in industrial processes in which coke could be very readily employed with at least equal advantage as a substitute, and yet the gas industry as a whole has available for sale less than nine million tons. There is, therefore, almost limitless scope for modern well-informed salesmanship and technical development.

It is one of the duties of technicians to devise means for improving the value of the products which he handles. Coke has had a great deal of attention in recent years. It is not a very exciting or inspiring subject, but it is nevertheless of great importance to the community in general and to the gas industry in particular. The public demands cheap power and smokeless chimneys. The use of electricity is one means of reducing the smoke nuisance, but the public are realizing that there is little sense in using electricity as a smokeless form of energy if the power stations where it is generated are belching forth huge volumes of smoke.

Wherever there is a gas-works coke breeze will be made, and there will always be a demand for steam within the vicinity, either on the works itself, industrially, or at the power station. Geographically, therefore, coke breeze is well distributed, there being a gas-works in practically all civilized communities. Coal is not nearly so readily available.

Now, although the demand for coke breeze is much less than is desirable, there is no real breeze problem. It is all being disposed of, but at rates which vary very considerably, some gas undertakings receiving as much as 10s. per ton; but this is not usual.

This diversity of price is only symptomatic of everything connected with the term "coke breeze." The term itself has different meanings in different parts of the country, and the same material may be known by different terms. In one place it is known as "coke ash;" in another as "coke ballast," and yet in each of these places it has a calorific value of at least 10,000 B.Th.U. per lb. At one place a screened product ⅜ in. to 1 in. is known as coke breeze—than which for many purposes there is no finer fuel—while in a neighbouring undertaking the same name is given to a product containing a large proportion of coke dust.

It would appear, therefore, that some standardization of nomenclature is necessary. It is still more important that sizing should be standardized. In a general way the term "breeze" is given to all the residual coke after the screened sizes of coke have been taken out in the screening plant. The actual size of the breeze depends on the mesh of the last screen. There should, therefore, be no such simple term as "breeze," but always "¾-in. breeze," "½-in. breeze," or "⅜-in. breeze," depending on the size of the last screen. Then again, the screens themselves require standardization, and the terms connected with them. It is possible to get two samples of (say) "¾-in. breeze" which will be entirely different in their sizing. The same applies to breeze as to tar or anything else. There cannot be a consistent demand at a fair price unless the quality of the material can be relied upon. Regular quality and constant characteristics are of more importance than high but variable quality. What applies to gas quality applies still more to coke breeze.

It is the practice in some undertakings to produce in the normal way ¾-in. to 0 breeze, but they supply spasmodically ⅜-in. to ¾-in. material, so during those periods making ⅜-in. to 0 breeze, as will be shown later, there may be a marked difference in the properties of these products, and it is safe to say that the wide differences in price, and the occasional difficulties in selling breeze, are often due to the uncertainty of its nature and properties.

Sources and Future of Breeze Production.

A study of the sources of breeze on gas-works and coke ovens will account for the causes of breeze formation, and throw light on the reasons for its variability of quality. If these are thoroughly understood it should be possible to eliminate some of the factors, and so reduce the amount of breeze produced, at the same time increasing the proportion of large coke, and materially improve its quality.

The amount of breeze present in coke as it leaves the carbonizing chamber is comparatively small. This is particularly so in static methods of carbonization. It is probable that in the coke leaving horizontal retorts, intermittent chambers, and coke ovens there will usually be less than 1½ p.ct. of breeze below ½ in. In continuous vertical retort practice the percentage is likely to be higher. In all systems the proportion of breeze from semi-caking coal is greater than from more highly caking coals. The coke as removed from the carbonizing chamber has a certain "potentiality" for breeze production in the subsequent handling operations, and this is dependent on a number of factors, the most important of which is the presence of individual pieces of ash or shale in the coal, particularly where fine grinding is not employed. While the particles of the caking coal become plastic, and merge their identity in a common continuous coke structure, the pieces of shale or ash remain unfused, and form planes of weakness, and assist fracture in coke handling. On being exposed these shaley particles often fall out, and find their way into the breeze. To that extent there is some advantage inasmuch as the ash content of the large coke is thereby reduced. It is common experience that large coke may often be 1 or 2 p.ct. lower in ash than would be the case if the coal had been finely ground.

Satisfactory coal cleaning would obviate this anomaly. It should not be necessary to urge that coal cleaning should be more general, bringing about a reduction of transport costs, an increase in gas and bye-product yields per ton of coal, an increase in throughputs in carbonizing plants, a reduction in capital and labour charges, and, most important of all, a radical improvement in the quality of the solid smokeless fuel-coke.

Carbonizing conditions can increase or decrease breeze production. Long continued over-coking, by increasing the shrinkage cracks increases the tendency to form breeze. On the other hand, uncarbonized portions of the charge are potential sources of breeze, owing to their ready abrasion. In coke handling, breeze to a greater or less extent is made all along the line. This comes in three main categories. In the first place, there is the breeze produced before and during coke quenching with water, and recovered from the quenching sump. This is usually wet, and often high in ash. Where water quenching is employed this will continue. Dry cooling of coke has been shown in certain instances to reduce the quantity of breeze made to such an extent that the saving has gone far to meet the extra capital involved.

The second cause of breeze formation is in the screen units and in the chutes. Coke requires to be handled with great care if breeze formation is to be kept low. The less it is dropped or jolted, and the less it is allowed to abrade on itself, the better. This is the main problem in coke handling. Breeze produced in this way has usually the same composition as the large coke, except when the free ash content of the coke is high.

The third cause of breeze production, and one that is becoming more and more important with the increased demand for graded coke, is the coke cutter. Even the best cutter must produce quantities of coke breeze. This cannot all be attributed to the deficiencies of the coke cutter. It is in some measure due to the inherent weakness of certain cokes due to any of the causes already mentioned.

The coke salesman should take particular care to ensure that breeze from varying sources is not indiscriminately mixed. If efficient mixing is not possible, it is better to keep them strictly separate, and arrange different outlets for each material.

Sufficient has been said about breeze production for you to realize that breeze is small coke, having all the characteristics of coke when cleaned coals have been carbonized, or when fine grinding is the rule. Otherwise it may be higher in ash

and moisture, but is still a solid smokeless fuel of high calorific value.

Breeze Utilization.

In discussing the subject of the industrial utilization of coke breeze, it is not proposed to give any consideration to breeze block production, or any other outlets than those in which the material is used as a fuel. If breeze is to get its full value as a fuel, it will be too high in price for any other purpose except in negligible quantities.

The two main outlets for breeze of all sizes are as boiler fuel and as producer fuel. For many years gas-works have used considerable quantities of their own breeze as boiler fuel. It is seldom that the steam requirements at gas-works are sufficient to require the use of all the breeze made, and with the increasing adoption of waste-heat boilers (so called) attached to carbonizing plants, the demand for breeze in this connection is diminishing. Where large quantities of steam are required for process work, such as ammonia distillation, there is not enough waste heat to meet such demands, but, generally speaking, there is enough waste heat on modern gas-works to supply all the usual requirements of the works. This may amount to as much as 1000 to 1200 lbs. per ton of coal carbonized. Other outlets had to be found, and the many years' experience of gas-works in steam raising have been a demonstration to outside industries that breeze is an excellent fuel for steam raising. It is also a smokeless solid fuel.

There is another direction, however, in which gas-works may, and do, utilize large quantities of breeze with advantage. By far the majority of modern types of carbonizing plants are to-day heated by means of gas made in step-grate producers using coke. The producer gas has a calorific value of 120 to 130 B.Th.U., and the temperature of the producer gas going to the plants is between 750 and 850° C. Air is usually induced through the fuel bed by means of stack draught, but most of these modern step-grate producers also have a steam injector attachment for auxiliary supplies when required. The hydrogen content of the gas is below 12 p.ct., and the CO_2 below 5 p.ct. The gasification zone is about 5 ft., and ample grate area is usually provided, at least 1·5 sq. ft. per ton of coal carbonized. Steam is also admitted with the air when the injector is not in use. This keeps down the temperature of the gasification zone, and reduces clinker troubles. A two-hourly tickling between the " steps " is all that should be necessary for the removal of ash.

Clinkering bars are not at all necessary. It has been found possible to use increasing quantities or percentages of breeze with these developments of producer design. Coke as made may contain as much as 16 p.ct. of ¾-in. breeze. This material is the usual material used on producers. It has been found possible on one London gas-works to increase this quantity to 43 p.ct. In this way the whole of the available breeze was disposed of, and displaced the larger size of coke. Sixty p.ct. of the ¾-in. breeze made was used in this way, and ton for ton had almost the heating value of large coke (about 80 p.ct.). This works is typical of the modern works using continuous vertical retorts and waste-heat boilers. What has been said so far about the utilization of breeze has been confined to step-grate producers attached to carbonizing plants. There is no reason why such producers should not be used in many other connections, where producer gas is required. This type of producer is efficient and low in capital and labour costs.

Breeze cannot be used so readily in the mechanical type of producer, although there are special designs available that can gasify breeze. Much experimental work has been done in this connection, but there have been more failures than successes. The high capital costs of mechanical producers can only be justified if gasification rates are high, or if the fuel to be used has a very low price, and if mechanical producers are the only means available in which to gasify breeze.

There is no reasonable justification for the price of breeze being so low, if its fuel value be the criterion, and there are other means of gasifying breeze. Breeze has usually a low fusion-point ash, and high gasification rates inevitably cause serious clinker troubles, " rat holing," and a bad producer gas.

Something must be said about blending breeze with the coal that is to be carbonized. In the author's opinion this is entirely practicable, subject to a number of important considerations.

1. If the breeze be high in ash it will increase the ash content of the resultant coke.
2. The maximum quantity of breeze in the blend will depend on the quality of the coal, but in any case should not exceed 5 p.ct.
3. The breeze and the coal must be ground small, and be efficiently mixed.
4. Such blending is only practicable for static methods of carbonization.
5. The addition of 5 p.ct. of coke dust to small highly swelling coals may prove an advantage in continuous vertical retorts.
6. The resultant coke will in many cases be improved in structure.
7. The throughput of the retorts for coal, and the resultant gas output will be reduced in proportion to the quantity of breeze used, but
8. Such a system of blending " up-grades " breeze to the large coke class.
9. Blending as suggested is unnecessary if there is a ready demand for the material at a fair price.

Apart from its ready utilization on certain gas-works there should be an increasing demand for this material on large boiler plants connected with electrical generating stations. Such places have the technical facilities to make the fullest use of the heat units, and are frequently contiguous to the supplies of coke breeze.

The author does not intend to go into any great detail on methods of burning coke breeze under boilers. The members of the Institute of Fuel have recently had advantage of much information on this subject. You have all read with interest the brochures of the London Coke Committee, giving details of the successful experiences of a London power station with the sandwich system. Those who visited the Deptford West power station saw the boilers in operation, where up to 50 p.ct. of coke breeze was being used. This has had the effect of materially reducing the quantity of smoke emitted from the chimneys.

The experience extending over ten years is important proof, if any be required, of the practicability of using coke breeze for boiler firing. Its efficiency in use is at least as high as coal. The quantity of coke breeze used for this purpose is only limited by the supplies.

Enough has been said to indicate that there is no economic coke breeze problem. There are a number of technical problems connected with coke breeze which the author has tried to enumerate. Coke breeze can be utilized, and is being utilized. It is worthy of greater standardization; and the most promising solution is cleaner coal.

Light Distributions from Lighting Fittings

The need has long been felt for a common terminology by which the characteristics of lighting fittings can be briefly described and compared, and the British Engineering Standards Association have just issued a specification which, it is felt, will be of great assistance in the illumination field. This is the British Standard Classification of Symmetrical Light Distributions from Lighting Fittings, No. 398, 1930.

The method adopted in this specification classifies for light distribution first by reference to the class of lighting for which a fitting is intended, and, secondly, by the character of the light distribution curve. The method in its present form is applicable only to lighting fittings which have a symmetrical light distribution.

The specification first defines the polar curve of light distribution, the solid of light distribution, and symmetrical and asymmetrical light distributions. Symmetrical light distributions, whose axes are regarded as vertical, are then classified as direct, semi-direct, general, semi-indirect, and indirect (specific definitions being given to each of these terms). Variations within these classes and similarities between fittings in two or more classes render a further classification necessary, and, in order to obtain the general character of the light distribution, the " frame ratio " is employed—*i.e.*, the ratio of the width " w " to the height " h " of a rectangle which just encloses the polar curve of the light distribution in the hemisphere containing the major portion of the total flux. The " frame ratio " is then used to define the following classes and terms: Class I., Extra Narrow; Class II., Narrow; Class III., Intermediate; Class IV., Wide; Class V., Extra Wide. The direction of maximum intensity is also given. Symmetrical light distribution whose axes in practice are not vertical come under the second classification only.

The specification includes an Appendix, which describes the method of arriving at the frame ratio in more detail, and gives examples.

Copies of this new British Standard No. 398, 1930, may be obtained from the British Engineering Standards Association, Publications Department, 28, Victoria Street, S.W. 1; price 2s. 2d., post free.

Scottish Junior Gas Association (Western District).

The Opening Meeting of the twenty-seventh Session was held in the Royal Technical College, Glasgow, on Saturday, Oct. 11. Mr. RONALD D. KEILLOR, Past-President, was in the chair. The minutes of the previous meeting were read and adopted. Mr. John Webster (Port Glasgow) was appointed Auditor in place of Mr. McGowan, who was elected to the Council. Mr. S. McGowan (Glasgow) was congratulated on gaining his First-Class Diploma in Gas Engineering.

The CHAIRMAN, in introducing Mr. Melvin, spoke very highly of his qualifications and ability, which qualities had been realized as was shown by Mr. Melvin's rapid promotion to a position of responsibility. Mr. Melvin was then called to deliver his Presidential Address.

PRESIDENTIAL ADDRESS

of DUNCAN D. MELVIN, M.Inst.Gas E., of Uddingston.

I intend to deal with unification, manufacture, and high-pressure distribution from a practical point of view, as exemplified in the Middle Ward of Lanarkshire Gas Scheme, more especially as these subjects are very much to the forefront at the present time.

PRELIMINARY STAGES.

The powers of a District Committee to undertake the supply of gas were conferred by the Local Government (Scotland) Act, 1894, which empowered District Committees to adopt the Burghs Gas Supply (Scotland) Act, 1876, within Special Lighting Districts. It was found that the machinery for the adoption of the Act of 1876 in a County Area was inadequate and inappropriate, and a Provisional Order for the County of Lanark was promoted in 1914 and duly became law. It will be seen, therefore, that this scheme to unify the gas-works in the Middle Ward of Lanarkshire was discussed prior to the war, and steps then taken to set the Scheme in operation. Due, however, to the intervention of the war and its aftermath it is only now that the scheme may be said to be getting into stride.

Prior to any steps being taken by the District Committee, there were the following gas undertakings in the Middle Ward of Lanarkshire: Baillieston (within the Glasgow Corporation Gas Supply Area); Bellshill; Blantyre; Bothwell and Uddingston; Busby (part); Cambuslang; Carfin (acquired by the Town Council of Motherwell and Wishaw); East Kilbride; Holytown; Larkhall; Newmains; Shotts (Stane and Dykehead); Stonehouse; and Strathaven.

The scheme in contemplation when the District Committee first took the question into consideration was the concentration of the manufacture of gas at Uddingston and also at Cambuslang so far as might be found desirable. These two works were modern in design, had the largest local outputs, were equipped with vertical retorts, and had a considerable margin of surplus plant, while the other works relied solely on horizontal retorts with the exception of Blantyre where there was a carburetted water gas plant.

ACQUISITION OF WORKS.

On various dates from 1920 onwards the following works were acquired:

—	Date Acquired.	Output when Acquired. Millions C.Ft.
Bellshill	31/5/20	55
Blantyre	31/5/24	40
Bothwell and Uddingston	30/4/21	123
Cambuslang	30/4/20	105
Carfin	15/5/23	15
East Kilbride	1/7/25	9
Holytown	30/6/21	17
Larkhall	31/5/20	40
Stonehouse	31/5/23	10

And, on the advice of the Consulting Engineer, each works was coupled up with high-pressure mains in the following stages and gas making discontinued.

1st Stage.—A 9-in. high-pressure main from Uddingston to Bellshill Gas-Works.

2nd Stage.—A 12-in. high-pressure main from Uddingston to Bothwell Bridge and a 7-in. main from there to Larkhall Gas-Works.

3rd Stage.—An 8-in. high-pressure main from Bellshill to Holytown Gas-Works.

4th Stage.—A 10-in. high-pressure main from Cambuslang to Blantyre and thence to couple up with the Uddingston-Larkhall main.

5th Stage.—An 8-in. high-pressure main from Holytown to Carfin Gas-Works.

6th Stage.—A 6-in. high-pressure main from Larkhall to Stonehouse Gas-Works.

7th Stage.—A 5-in. high-pressure main from the Cambuslang-Blantyre main to East Kilbride Gas-Works.

Seven works, therefore, discontinued gas-making and were supplied from one or other of the manufacturing centres. All of these works were equipped with gasholders, but it was found that some of these were inadequate in capacity or did not give sufficient pressure during the periods of heavy demand. These works now supply their areas through high-pressure governors.

Advantage was taken in planning the routes of the mains so that the more populous areas were traversed, and many consumers are supplied from the high-pressure mains through governors either in groups or singly. Outlying low-pressure supply areas are also reinforced during peak loads by governors which come into action as the occasion arises.

It should perhaps be mentioned at this stage that each works as it was taken over still kept its individuality. Each works and district was managed by a small Gas Committee which purchased gas in bulk from the Manufacturing Centre and sold it—fixing their own price and balancing their own accounts. This was in accordance with the Provisional Order and was due, to some extent, to the large differences in prices that existed. It is only recently that all these committees have joined together for mutual benefit.

I now propose to deal with the practical side of the scheme and, from the manufacturing viewpoint, can, of course, only speak of Uddingston.

THE PRESIDENT.

DUNCAN D. MELVIN, M.Inst.Gas E., of Uddingston.

Mr. Melvin was educated at Rutherglen Academy and the Royal Technical College, Glasgow. He received his early training at the Dalmarnock Works of the Glasgow Corporation, and was Chief Chemist when he left to take up the appointment of Assistant Engineer and Chemist to the County of Lanark Gas-Works, Uddingston, in 1924. He was appointed Works Manager in 1930. During the war Mr. Melvin served with the Royal Scots, and was twice wounded. He holds the City and Guilds of London Institute Certificates in Gas Engineering and Gas Supply, and was Silver Medallist in Gas Supply in 1923. He is a Member of the Institution of Gas Engineers, and gained his Diploma in Gas Engineering in 1925.

The calorific value of the gas supplied is 400 B.Th.U. per c.ft. throughout the area, the Gas Regulation Act having been adopted some years ago. What the calorific values in the individual works were before amalgamation is hard to say, as none of the works were equipped for testing. Some supplied gas of a very high value, and others were gradually working down ready for the change over. None were down as low as 400, and, as each district was coupled up, the first task was the complete re-adjustment of all the appliances which was done as speedily as possible to avoid dissatisfaction.

MANUFACTURE AT UDDINGSTON.

At Uddingston gas is manufactured solely in Glover-West vertical retorts. At the time the works were bought over (1921) the manufacturing plant consisted of 24 three-ton retorts of

which only 8 were required to meet the maximum demand from the Uddingston area. There was also provision left for an additional 8 retorts, and these were installed, together with a waste-heat boiler, in 1924. It says much for the original designer of the plant that it is now producing 400 p.ct. more gas than in 1921 with an increase of only 33⅓ p.ct. in the number of retorts.

The heating system in the Glover-West retorts lends itself admirably to the production of 400 B.Th.U. gas, as a high bottom heat can be maintained with ease and steaming carried out to the best advantage. As the beds have been gradually rebuilt, advantage has been taken of the opportunity and the heating system adapted to suit the circumstances. The bottom air circulating chamber has now been converted into a combustion chamber, and there are now six horizontal combustion and three circulating flues. Each combustion flue has its own producer gas damper, secondary air inlet, and auxiliary air inlet separately controlled, so that the heat may be supplied at a maximum according to the coal used. 75 p.ct. of the retorts are built in silica.

All the producers, which are on the small side, are fitted with steam blowers so that they may be worked under ordinary conditions or under forced draught. These blowers are used should the coke be small or of inferior quality and were found particularly valuable during the last coal strike, enabling the heats to be maintained at little below normal working. They are of a simple design and, due to the construction of the Glover-West producer, do not require any alteration to the existing layout. When in operation the doors of the producer are closed. The amount of air forced in depends on the quality and size of coke and is regulated by the analysis of the producer gas and inspection of the heats. More or less steam is supplied to the blower by regulating the steam valve or the steam pressure. As the producers are not all alike, some improvement in control is gained by having a needle valve or regulator in place of the ordinary screw-down valve, and this allows each fire to be more accurately controlled. In addition to the steam entering through the blower, there are two auxiliary steam supplies. One is a perforated pipe running above the top bar of the producer, the other bubbling into the water in the ash pan. The valves to these pipes are just cracked, and this prevents the formation of clinker. When the blowers are in operation the heats can be raised to any desired temperature; they are more even, and carbonizing conditions consequently more easily controlled.

One setting is equipped with a waste-heat boiler. This boiler is of the vertical type, with cross tubes, and works on natural draught. With feed water supplied at a temperature of 140° F. and waste gases at 850° C., it produces 420 lbs. of superheated steam per hour at 55 lbs. per sq. in. pressure.

The carbonizing results for the past twelve months may prove of interest. Only Lanarkshire washed doubles, 75 p.ct. of which come from one colliery, are used—the average moisture content being 11 p.ct.

Make per ton	20·373 c.ft. = 82·1 therms
Calorific value	403 B.Th.U. per c.ft.
Tar per ton	21·7 gallons
Screened coke sold per ton	6·5 cwt.
Sulphate of ammonia (neutral) per ton	36 lbs.
Coke used at producers	17·2 lbs per 100 lbs. coal carbonized

The remainder of the works plant is of the usual type and will be seen when the works are visited later in the session.

There are two gasholders in the works and one of them is utilized exclusively for the outlying districts so that there has been no trouble with pulsations on the district governors from the compressing plant.

Compressing Plant.

The high-pressure distributing plant consists of three steam-driven compressors—namely,

(1) A rotary compressor. Capacity 50,000 c.ft. per hour against 2½ lbs. pressure at 108 r.p.m.
(2) A rotary compressor, water-cooled. Capacity 80,000 c.ft. per hour against 5 lbs. pressure at 88 r.p.m.
(3) A vertical reciprocating compressor. Capacity 150,000 c.ft. per hour against 15 lbs. pressure at 325 r.p.m.

The vertical compressor was installed last winter, as the other machines were overtaxed.

The works supplied from Uddingston with gas are divided into two sections.

Section 1.—Bellshill	2¾	miles distant
Holytown	4½	,, ,,
Carfin	6¼	,, ,,
Section 2.—Larkhall	7⅜	,, ,,
Stonehouse	11¼	,, ,,

together with three villages and numerous consumers *en route*.

At the times of our maximum load, a pressure of 2½ lbs. is sufficient for Section 1 and 5 lbs. for Section 2. The pressure on each pipe line is controlled by means of a valve according to which machines are in use. If the rotaries are on, the smaller machine runs at 2½ lbs. pressure and the larger one at 5 lbs. pressure. As the smaller machine cannot keep one section going, the large machine is allowed to assist it by manipulating the valve. When the vertical compressor is running, rotaries act as stand-bys, and by means of a valve one pipeline is kept at 2½ lbs. pressure and the other at 5 lbs. The compressor is controlled at this pressure by means of the piston regulator. This system is simple and has been found very effective for our purpose. Provision has also been made for running one section alone under pressure for filling holders during the day, the other being kept at holder pressure. No receiver tank has yet been installed to cut down pulsations and collect condensate, as there is a long stretch of main before the first consumer is reached, and most of the condensate comes down in the first two traps. The ideal method would be to have a collecting and anti-pulsation chamber with branching mains to each section and the pressure controlled by governors, and this arrangement will doubtless be installed as the scheme progresses.

Cost of Compressing Gas.

The cost of compressing gas is a useful figure to know, and, taking the annual charges for the past twelve months, this works out at 0·89d. per 1000 c.ft. compressed. This charge is made up as follows:

	£
Capital charges and maintenance	375
Running costs, steam, oil, &c.	160
Labour	390
	£925

The total hours pumped is 4300 and the quantity of gas 250 millions.

High-Pressure Mains.

All the high-pressure mains are of steel—some with long-sleeve lead and yarn joints and others with long-sleeve welded joints. The mains are coated outside only with specially prepared bituminous solution and wrapped with hessian cloth drawn through hot solution.

Each works as it was taken over had a rotary meter installed, and the amount of gas passing through was paid for by each separate undertaking. Now that all districts are unified this is no longer necessary, but they are still kept in use as they provide valuable information as to the demands of the various districts, giving comparative figures day by day instead of waiting for the meter surveys being completed.

Pressure gauges are provided at each station, and recorders are installed at the furthest out points, the weekly charts being forwarded to the manufacturing centres. The pressure in the mains is regulated according to the estimated demand, and, as this is fairly consistent, no trouble is experienced.

Connections from High-Pressure Mains.

Since the scheme commenced there have been several extensions to the high-pressure mains and numerous side branches. It is often impracticable to shut down a high-pressure section if no holder is "floating" on it, and use has to be made of the under-pressure method of putting in branches. There must be plenty of room alongside the main for the drilling apparatus, and the cut is made when the compressors are off.

No valves have yet been inserted on the district by this method, but it has been used on the works for inserting a 16-in. valve on a live main, and I would have no hesitation in doing the same on the district should the occasion arise.

When making connections for individual consumers the connection is usually made with an expanded nipple equipment. The governor is built into a box in a suitable position, and a cock is fitted in case of emergency. Incorporated in the governor is a mercury seal which is set to blow-off at (say) 8-10 in. should the diaphragm burst or the governor fail.

This blow-off is carried to some suitable position away from any windows or place of danger. These governors are visited periodically for the purpose of inspection and oiling of the diaphragm and, in the winter, are suitably insulated to keep out frost.

Progress of Scheme.

The rapid expansion which has taken place in the various works since they were taken over is due, to some extent, to reductions in price and to giving the consumer attention and encouragement to burn gas by supplying appliances on attractive terms. Any increase in output due to the reduction in calorific value would be shown in the first year, the increase after that being on a 400 B.Th.U. basis. Over the first five years the output has more than doubled. Since the last coal strike, however, the whole of Lanarkshire has been sorely depressed industrially, and this is to some extent retarding developments. Depending as we do on an industrial population in the worst county for unemployment in the country, the scarcity of work and money cannot but be felt.

I do not propose dealing with the financial side of the question of amalgamation in this paper, but I have drawn up a statement showing the savings accruing on the manufacturing side. It should be explained that most of the books and records of the old individual companies were retained by them or destroyed and have not been available for inspection. It has been possi-

ble, however, to glean sufficient information as to carbonizing results to show that the average results are as follows:

—	Horizontal Retorts. Old Works.	Vertical Retorts. At Present.
Therms per ton of coal carbonized . .	50	82
Coke sold per ton of coal carbonized .	7 cwt.	6·5 cwt.
Tar sold per ton of coal carbonized .	10 gallons	21·5 gallons

And with an output of 1,204,800 therms we have the following comparisons:

Horizontal Retorts (Old Works).

	£	£
24,096 tons of coal at 16s. per ton . .		19,277
Giving 8434 tons of coke at 20s. per ton	8434	
240,960 gallons of tar at 2d. per gallon .	2008	
		10,442
Net cost of coal is . . .		£8,835

Vertical Retorts.

	£	£
14,693 tons of coal at 16s. per ton . .		11,754
Giving 4775 tons of coke at 20s. per ton	4775	
315,900 gallons of tar at 2d. per gallon .	2633	
		7,408
Net cost of coal is . . .		£4,346

This statement shows a saving of about £4500 on coal alone; but it is obvious, I think, that the saving would be even greater if due allowance was made for cheaper buying, in one quantity, and handling coal and coke in trucks as against cart loads. The working results in the horizontals are poor and not to be compared with present-day practice in modern settings and larger works. The low coke yield, for example, is due to the number of retorts hanging under fire in each works and also to the type of setting in use.

Advantages and Disadvantages of the Scheme.

In conclusion, if a summary of the advantages and disadvantages of this amalgamation scheme were asked the following might be included:

Advantages.

Lower manufacturing and working costs.
More economical running of manufacturing plant.
More efficient control of manufacture and quality of gas.
Cheaper buying of materials, stores, &c.
Better service to the consumer.
Better distribution services.

Disadvantages.

Higher interest and sinking fund charges when works are bought out and goodwill has to be paid for and, consequently, a higher rateable value.

Discussion.

Mr. R. D. Keillor, in opening the discussion, congratulated Mr. Melvin on his excellent address. The subject was unique and yet possibly of very great importance in the near future, as the grid system would in all probability extend. The choice of a manufacturing centre in such a scheme depended on the availability of cheap coal, and the linking-up gave new fields for development. He was very interested in Mr. Melvin's remarks relative to producers and blowers. The size, he understood, was No. 3 Meldrum blowers with ½-in. steam jets, two blowers per producer. With regard to water heat, he asked Mr. Melvin what amount of steam per lb. of coke was realized. Uddingston some years ago had produced results sufficient to warrant investigation by the Institution, and it appeared that the results were still of the same high order. The Bryan-Donkin compressors referred to had almost a perfect system of lubrication, entirely automatic. He asked for some further details relative to the practical compression of high-pressure and low-pressure distribution, the effect of temperature difference, and what type of meters was used. He asked how publicity was effected. Street lighting was another problem for such a scheme. Mr. Keillor, in conclusion, asked how the figures in the cost statement had been arrived at and particularly the price for tar.

Mr. A. McDonald (Motherwell) referred to the unification at Motherwell, which was similar but on a smaller scale, two weeks only being involved. The gas at Uddingston was 400 B.Th.U., and in some of the other works higher. What was the effect of the drop in C.V. to consumers? With regard to the increase of 400 p.ct. in the make at Uddingston, was this due to higher heats and steaming, or the flexibility of the plant. He asked for further particulars of lead joints as against welded. Was the unaccounted-for gas increased by the increase in pressure? He regretted that financial details were not available, as they would have been most interesting. The financial side should be the determining factor in such a scheme.

Mr. A. Tran (Helensburgh) referred to high-pressure distribution as a most interesting selection of subject. He asked for particulars as to the size of mains. Did service governors function efficiently, and were rotary meters accurate? He referred to the Larkhall output as phenomenal, and asked for fuller details regarding the net cost of coal and capital costs.

Mr. J. K. Frazer (Glasgow) congratulated Mr. Melvin on his splendid address and the Juniors on their new President. He appealed for loyal support throughout the new Session, and expressed his very good wishes to the Association.

Mr. J. Greig (Glasgow) referred to the address as a most practical one. To anyone engaged wholly in the works, such a paper was invaluable. He asked if Mr. Melvin had tried the effect of altering the steam jets which gave a hotter producer gas. He asked what Mr. Melvin's experience of silica retorts was.

Mr. R. Sturrock (Ardrossan), in congratulating Mr. Melvin, asked for particulars of the governors and the reduced pressure; also the type of service governors. What was the analysis of the gas and the percentage of inerts?

Mr. S. McGowan (Glasgow) thanked the members for their recognition of the Diploma he gained. He congratulated Mr. Melvin on his thorough address. He asked if 500 B.Th.U. gas would not have been a better gas, though perhaps more costly to make.

Mr. Hall (Glasgow) stated that he felt the days of the small works were numbered. The tendency was to centralize production, and these centres would depend on manufacturing costs. The lines given by Mr. Melvin for unification were ideal.

Mr. W. Campbell (Falkirk) considered 400 B.Th.U. as rather a low C.V. and asked the reason. The compressing of the gas should throw down any water, and, in his opinion, the low-pressure gas should be practically dry. What was the effect of compression on C.V.? Was the gas tested on the district? He asked if there was an automatic high-pressure valve to operate directly into the low-pressure main.

Mr. Melvin, replying, thanked the members for the interest and appreciation shown. The calorific value of 400 was adopted for the area, as both manufacturing centres were already on this basis. It was found that, taking everything into consideration, this was the cheapest gas to produce in their particular local circumstances. This value gave satisfactory results on the district, and no trouble had been experienced in distributing it. The different works, as would be seen from the paper, were taken over in different years, and, in the case of Blantyre, the reduction in calorific value was made gradually, using the water gas plant, before the change-over took place. With the other works, the change was felt immediately, but readjustment of appliances and pressure was done speedily.

The Uddingston verticals were built in pre-war days, and the increase in productive capacity showed the generous lines on which the plant was designed. Part of the increase in capacity was also due to the use of silica retorts and the increased production of therms with increased steaming. The silica retorts had given every satisfaction, leading to a 10 to 15 p.ct. increase in throughput, an increased make per ton, and a greater decomposition of steam, together with a reduced fuel figure. The first bed was built in 1927 and had not yet been let down, no repairs having been done to it. Care must be exercised in lighting up or letting down a silica bed. 3½ in. of a rise on a 20-ft. retort had been measured, and 2½ in. of the drop after one bed had worked for six months. The steam blowers were used mainly during the last coal strike, the producers, now re-designed, giving excellent results with average char, screened over a ¾-in. bar screen. The depth of the fuel bed was about 7 ft., and the producer gas was sampled through a silica tube into a glass sampling jar. No CO recorder was used.

The analysis of the coal gas made was as follows:

	P.Ct.
CO_2	6·0
C_nH_m	1·6
O	0·6
CO	19·6
CH	13·4
H	50·8
N	8·0

Showing total inerts of 14·6 p.ct.

No reduction in calorific value had been found between the manufacturing and distributing centres.

Of the two types of joints in use, the welded joint was to be preferred, provided suitable expansion joints were left at intervals. Due to mineral subsidence, the unaccounted-for gas had gone up. The service governors on the high-pressure main were also of the Reynolds type, and pressure charts taken at the outlet showed a perfectly straight line. The rotary meters used to measure the gas as it was received at the distributing centres gave accurate results, provided the minimum consumption was not less than 10 p.ct. of the rated maximum capacity of the meter. The pressure from the distributing centres was adjusted to suit local needs and conditions and might be anything from 4 to 6 in.

The Larkhall chart certainly showed a large increase—no large housing extensions had been made, but several re-housing schemes had been effected. This increase had been repeated in several other centres also, and was due to local price reductions and favourable terms for fitting appliances and carcassing houses where no gas was used before. The figures in the cost statement were comparative only, although the tar figure of 2d. per gallon was more than reached last year. The street lighting was not controlled by the Gas Department, and was, until last May, run by local Lighting Committees. Under the Derating Bill, these Committees had all amalgamated, and the lighting was now under central control.

With regard to advertising and publicity, a very successful Gas Exhibition had been run at Cambuslang last spring, and it was the intention to continue these.

In conclusion, Mr. Melvin stated that to go into the financial details would occupy a whole evening in itself in order to do justice to the various aspects and comparisons. Many of the advantages of amalgamation were just beginning to be felt, since all the subcommittees were only joined together last October. It should be borne in mind that this was not a question of the buying-out of several small undertakings by a large neighbour, but rather the amalgamation of a number of comparatively small undertakings. A new staff had to be created, and it necessarily took time for the various parts to dovetail together. Sufficient time had not yet elapsed to form a considered judgment on the merits of the scheme.

Yorkshire Junior Gas Association

Address by Mr. H. E. Bloor, of York

The Opening Meeting of the new session of the Yorkshire Junior Gas Association took place on Oct. 18, the gathering—as has now been customary for a good many years past—being at the Lecture Theatre of the Fuel Department of the Leeds University.

Mr. F. FIRTH, A.I.C., Chief Chemist to the Leeds Corporation Gas Department, and retiring President of the Association, presided over the earlier part of the proceedings, and was supported by Mr. J. W. Horwill (Commercial Assistant to the Bradford Corporation Gas Department), the President-Elect. There was an attendance of over seventy members.

Prof. J. W. Cobb, Head of the Fuel Department, wrote regretting inability to be present to give the members a welcome on behalf of the University authorities.

A letter was received from Mr. C. S. Shapley, Engineer and Manager to the Leeds Gas Department, congratulating Mr. Firth on the conclusion of a year in which he had acquitted himself in the chair to the credit of himself and the Leeds Undertaking, and expressing good wishes to his successor, Mr. Horwill, for the coming year.

Mr. FIRTH said he wished to offer, through the chair, the congratulations of the Association generally to several members who during the past year had received well-merited promotion in their particular undertakings, and also to those members of the Yorkshire Junior Association who had passed the Examinations of the Institute of Gas Engineers.

ANNUAL REPORT.

The annual report, presented by Mr. R. Crowther (Elland), Hon. Secretary of the Association, stated that eight general meetings had been held during the past session, including the joint meeting with the Manchester and District Junior Gas Association, when visits had been paid to the works of Messrs. West's Gas Improvement Company, Ltd., and the City Justices' Meter Testing Station at Manchester. The membership of the Association was now 209—a net increase of 15 for the year.

The Council had to record, with deep regret, the passing of Mr. C. T. B. Roper, of Bradford, a former Hon. Secretary, Past-President, and a staunch supporter of the Association from its inception 27 years ago. Mr. J. Bridge, F.C.S., Engineer and Manager to the Elland-cum-Greetland Gas Company, had been unanimously elected an Hon. Member of the Association in recognition of his services to the Junior Gas Associations while acting as representative on the Institution of Gas Engineers' Education Committee. The Yorkshire District Education Committee had met on two occasions during the year. There had been alterations in the Education scheme which, while maintaining the high standard set by the Institution, gave greater facilities for students desirous of entering the various examinations. Students were requested to communicate with the Committee in all cases of difficulty in order that the studies could be properly co-ordinated. The number of centres of instruction had been increased, as had also the number of students, and the percentage of passes had increased.

The following were the members of the Yorkshire District Education Committee: Representatives of the Manchester District Institution of Gas Engineers, Messrs. J. Bridge, Elland (Chairman); F. H. Robinson, Harrogate; J. E. Lister-Cooper, Yeadon; and C. W. Ward, Wakefield. Representatives of the Yorkshire Junior Gas Association, Messrs. C. H. Chester, Wakefield (Hon. Secretary); J. W. Horwill, Bradford; R. N. Webb, Leeds; and A. Wylie, Sheffield. Also Mr. J. Wilson, H.M. Inspector of Education, co-opted.

The financial statement, presented by the Treasurer (Mr. H. Wilde, Bradford), showed a credit balance of £88 11s. 9d., as compared with £96 3s. 5d. at the end of the previous year.

In moving the adoption of the Report and Accounts, the PRESIDENT referred in feeling terms to the great loss which the Association had suffered by the death of Mr. Roper; and the meeting rose in silence as a mark of respect.

NEW OFFICERS.

The following were elected to office for the ensuing year:

President.—Mr. J. W. Horwill, Commercial Assistant, Bradford Corporation Gas Department.

Senior Vice-President.—Mr. J. W. Holroyd, Elland-cum-Greetland Gas Company

Junior Vice-President.—Mr. J. W. Wood, M.Sc., Research Chemist for Leeds University at the Meadow Lane Gas-Works.

Hon. Treasurer.—Mr. H. Wilde, Bradford Gas Department Showrooms.

Hon. Secretary.—Mr. R. Crowther, Elland-cum-Greetland Gas Company.

Assistant Secretary.—Mr. J. R. Firth, Bradford Gas Showrooms.

New Members of Council.—Messrs. D. T. Livesey (Doncaster), B. Thorpe (Huddersfield), F. Murphy (Barnsley), and R. N. Webb (Leeds).

Representatives on District Education Committee.—Messrs. C. H. Chester (Wakefield), R. N. Webb (Leeds), A. Wylie (Sheffield), and J. W. Horwill (Bradford).

Hon. Auditors.—Messrs. A. W. Arnold (Bradford) and F. Lodge (Wakefield).

Mr. HORWILL, on taking the chair, presented to Mr. Firth, the retiring President, the Association's medallion as a memento of his year of office.

A vote of thanks to the retiring President, officers, members of Council, and hon. auditors for their services during the past year was accorded on the motion of Mr. L. R. COWLEY (Shipley), seconded by Mr. J. BRIDGE.

Mr. BRIDGE took the opportunity to express his appreciation of the action of the Association in electing him an Hon. Member. He had, of course, always been closely associated with the Association since coming into the industry in Yorkshire, and was proud to know that practically all the members of his staff were members of the Association, that the Association's Secretary was one of the Elland staff, and that next year's President, all being well, would be one of his staff. [Applause.] He had followed with great interest the work of the Association during a year which began with a splendid Presidential Address by Mr. Firth which had, one might say, become recognized as something in the nature of a standard work of reference. ["Hear, hear."] Commenting on the work of the Education Committee, Mr. Bridge said he was delighted that, as result of the examinations, 19 certificates had been presented at Manchester the previous week. This number was in excess of that of any previous occasion. The one disappointment, to his mind, was that, of the 19, only two of them actually came into their great county of Yorkshire—the remaining 17 going to Lancashire.

Mr. HORWILL, responding to the vote of thanks on behalf of the officers, said the Council of the Association had been looking into the matter of the library, and had come to the conclusion that it needed a good deal of replenishment. The Council therefore invited members to assist them.

ADDRESS

By H. E. BLOOR, B.Sc., Engineer, Manager, and Secretary to the York Gas Company.

It is commonly asserted that people order goods more freely on credit than when cash is demanded. Possibly some comparable influences may have been at work when, some months ago, Mr. Horwill asked me to deliver an address to you to-day. October seemed a long way off, and I agreed to address you, having thought only so far as to realize that the invitation was in the nature of a compliment, and therefore not lightly to be refused.

I found it a difficult task to decide upon what subject to address you. Mr. Horwill, no doubt meaning to be kind, left the choice to me, and many subjects which might have served were passed in review before finally I resolved to find in the circumstances of the case a solution of my problem. I confront you, therefore, as a senior, occupying a seat which some junior must one day assume, having had opportunities of experience more or less well grasped, and looking on you as the coming leaders of the industry which, I hope, we are all proud to serve. Those last words provide occasion for a few reflections on the relations of industry in general and its servants, and more particularly of our industry and its servants.

THE TEAM SPIRIT.

I cannot see any industrial undertaking as other than a team engaged in a competition or an army in the industrial field. If we adopt either simile, the penalty of lack of *esprit de corps* or team spirit, of confidence in leaders and of determination to succeed, is defeat inevitable and final—failing a change of heart.

How far the lack of loyalty and discipline, and pride in the organization, which is so noticeable a feature of our recent industrial history, is responsible for our troubles of to-day, I am unable to say. Nevertheless, I feel things might have been different in many ways to our advantage had the goodwill and enthusiasm for the cause, which obtains in our industry, been general throughout British Industry.

We are plagued in this country with many well-meaning and sentimental people who are for ever pitying someone or something. A favourite subject with such persons is the monotony of labour. As well waste time pitying fishes for being condemned to live in cold water. The daily grind is and must be the lot of the majority of mankind. It only becomes mono-

tonous, uninteresting, distasteful, boring, or what you will, when it becomes absolutely nothing but a necessity of existence, and no more.

Every competent authority will agree that the difficulty is to fill the jobs to which the charge of monotony is *not* applied, and for the rest, the consciousness of filling a necessary place in the team, a conception of one's job as a service to one's fellows, or an ambition however limited, to rise in status, transforms the outlook and makes life worth living, and work worth doing.

In all these respects we may be envied for the general happiness which obtains and which with rare exceptions has, I believe, always obtained in our Industry, at any rate throughout my experience.

Analysis of the causes of so enviable a state may not be unfruitful. I would claim that the Gas Industry enjoys in rare degree the interest, the enthusiasm, and loyalty of its personnel. Assuming this to be so, and we but men as other men are, why is it so? The answer may partly be that in all but very few cases the personnel of gas undertakings is not so numerous, but that contact may be maintained between all ranks. Mainly, however, I conceive the reason to lie in the peculiar nature and situation of our Industry. Gas may once have been the fashionable craze. If so it was before I entered the Industry.

I have always understood that when my father put me into the Gas Industry, he was told by more than one that he was entering me for a profession which would cease to exist in a few years, having been ousted by electricity. The threat of electricity has thus existed throughout my time. This point will be again referred to.

In my time gas has been the " ugly duckling " and acutely conscious of the fact. " Cinderella " perhaps better expresses my meaning. Now nothing more strongly stimulates loyalty than a cause conscious of merit not fully appreciated. It is probably no one's fault, but due to inevitable causes, that everybody engaged in our Industry realizes better than those outside how worthy to be praised we were, and I trust are.

Gas made the real revolution in urban life by making it possible and safe to walk and work and play after dark. The Gas Industry furnished for a long time the sole example of the treatment of the nation's wealth in coal as the basis of a chemical industry.

Mention of this fact brings before the mind how vitally different a world you face than did my generation. The difference is not one merely of degree but of kind.

A Change of Outlook.

The whole base from which the gas man looks out on his world seems to me to have changed—with amazing rapidity. There was a time—it seems only yesterday—when we thought, nay we knew, that the world could not function without us. Did we not make ammonia, and was it not a fact that the supplies of sulphate of ammonia which came from our works had solved a mighty problem—no less a one than the feeding of the world's population? Society told us what it thought of that service in that unmistakable way which cannot be denied—it purchased our product at a price which left us a fine profit. Gas couldn't be done without, we said, for our ammonia alone. Need I sketch for an audience like this the present situation? Earth to earth, ashes to ashes! Ammonia *was* a noxious impurity and is so again. Far better for us had coal distillation not produced it.

Then our tar fired the imagination, with its wonderful possibilities, revealed by Perkins, and developed alas in Germany. But pitch, creosote, and phenols were valuable, irreplaceable, and essential to mankind, though possibly not quite needed in quantity equal to production, so that the price of tar was not always, we thought, commensurate with its real value.

And then we had coke. Again apt to be produced in too great quantity so that it spoiled its own market—but how necessary and how valuable; and how would mankind do without it and where could it be obtained except from that treasure house, the gas-works?

The situation of these products at the present time is fortunately not like that of ammonia; for both tar and coke command a market at satisfactory prices, but *gas* tar and *gas* coke now need to be so described. No longer do they enjoy a practical monopoly in their fields. The world could just stagger along to-day without either our tar or our coke, though it might have to pay a good deal more for its supplies. We find, in fact, that all our residuals, actually or potentially, form that surplus production which helps the world to get its requirements cheaply, where once we were exclusive sources of these products.

No longer then can we regard gas as merely the high spot in a panorama of vital services, but if I am right we shall stand or fall upon gas. But the position of gas itself has been totally altered during the past few years.

At First a Speculative Industry.

You all know how gas supply started as a speculative industry, mainly looking to street lighting as its field; how the field was widened to include internal lighting, as experience and confidence grew; how gradually cooking was added, largely through the enterprise of the appliance manufacturers, how gas filled the position, now almost entirely usurped by electricity, as the small power unit par excellence, and how in all these fields of light and labour saving gas held a monopoly of the field—a field which may be described as that of energy " on tap."

The statutory history very clearly follows and expresses the economic position of the Industry. As an industry requiring access to the subsoil of public streets for gas mains, the necessity for Parliamentary rights is obvious, and the inevitability of some control in exchange for privilege is apparent.

It is impossible to study the Gas Acts without realizing that they imply a complete acceptance by Parliament of the economic necessity of gas. But the matter goes deeper than that statement would imply, I think, and I suggest that a fair inference to draw from the Acts is that Parliament envisaged the Gas Industry, not merely as a necessity, but as exercising an effective monopoly, not of commodity only, but of services.

When Parliament in its wisdom, and after experiments along other lines, decided that gas supply should in the public interest be a regulated monopoly in each area, there was no possible competition in the field. The grant of an Act thus amounted to the conferring of a monopoly which officially was a monopoly as regards gas supply, actually a monopoly of the power to supply light, heat, and energy on tap, and in practice if not in theory, although never recognized as such, a monopoly of the market for smokeless fuel (coke) in the area. This is merely another way of saying that gas and coke had no competition during the period of Gas Legislation.

Life was very comfortable, and, indeed, " the world went very well then." Events had made the keeping of an apparently ample margin between the maximum and the necessary prices, to cover all possible contingencies, very easy; and only the managements of sliding-scale gas companies had any serious incentive to worry about price. That many did worry and to some purpose, is to their eternal credit, for their material reward was negligible as compared with the reward of equal merit in any other industry.

To be a municipal gas manager was to be an official administering a public department.

Any abnormal efficiency causing reduced costs, produced a lower price of gas. " Profits " remained sufficient to pay capital charges and perhaps something for the rates, and there you were.

Even in company administration the results were largely the same. Efficiency which might have doubled or trebled the profits in industry merely lowered the price or gave an infinitesimal increase of dividend to the proprietors.

It is my opinion that the atmosphere throughout this period was too " official " for the reasons I have given, and that full use was never made of the priceless opportunity furnished by three generations of monopoly.

Stifled by Parliamentary Control.

The development of technical invention was stifled by Parliamentary control of quality, and only by superhuman efforts was a revolution in the policy regarding quality of gas placed on the Statute Book.

Almost the entire field of invention as expressed in carbonization by other than horizontal retorts and unsteamed verticals was in effect closed, and the catastrophe of a world war alone could probably have freed us from these shackles by this date. So slowly do such things move.

Not on the technical side alone, however, did the system of control play a part, for the acceptance of the one price idea, which is all that Parliament has recognized up to now, may have played an even more profound part in stereotyping thought on the commercial side of gas administration.

That the price should be uniform, and that price reflected the service rendered to the community by the management, was the view of Parliament, and that profits were made or lost in the retort house was the view of the Industry.

Most of you will be aware of the recent history of electricity supply, since " electricity " became a political cry. It is somewhat amusing to hear as one constantly does, from all sorts of quarters, of electricity as the " modern " thing; the up-to-date idea not to adopt which is to dub oneself old-fashioned.

Not infrequently the thought has obtruded itself upon me that one's idea of age changes as one grows older. It must be a heartening thought for the old centenarian gas to find that even children nowadays are taught to regard the electricity supply industry, with its forty-seven years of existence, as quite the very latest thing.

The truth is that electricity supply is only a little less doddering with age than we are ourselves. But " electricity " in the widest sense of the word is constantly providing mankind with fresh surprises, all of which keep the word " electricity " before the minds of the public.

Our industry has nothing to fear from a comparison between its scientific development since 1883 and that of our competitor. The gas fire as we know it is definitely more scientific and more modern than the electric convector, which in principle and effect remains precisely where it stood when first discovered.

Gas appliances to-day are scientific instruments, and we have every right to be proud of them, while the technique of gas

manufacture has been the subject of revolutionary change in recent years.

The "Younger" Industry.

We are in some respects essentially younger, and more the product of this age than our competitor; and yet are compelled to recognize that we are described as decadent and doomed to extinction, on countless platforms, and our protestations that we "never felt better in our lives" fall on apparently deaf ears in many cases.

What is new about electricity supply thus appears to the vast advertisement which it secures from the "discovery" of electricity by politicians. The State assistance, by advertisement in Parliament and out, and the financial support which followed seems to have been attributable to a fallacious belief, founded on a false reading of American conditions, that British Industry had difficulty in securing ample and cheap power, and that all that was necessary in order to become as prosperous as America was to use as much electricity. Another set of ideas which may be crystallized into the phrase "Electricity for the masses" also played a not unimportant part. All the parties fell for the whole thing, so that we have heard little on the latter point, except that some play has been made with "Electricity for Rural Areas."

Having regard to the state of agriculture I suggest this is on a par with offering a cocktail (some time) to a man dying (presently) of thirst.

However, we may suppose that with the aid of the Electricity Commissioners and much good money we shall see rural electricity some day. These commissioners are worth earnest thought, for in them our friends have a permanent, highly paid statutory body having the Cabinet ear and with only one object in life—the advancement of electricity supply.

It is in my view a great pity that our industry is not similarly provided, and should any of you differ I would invite you to consider the recent production by the Electricity Commissioners of what amounts to a carefully thought out scheme for the capture of our business.

Through the agency of the Commissioners, lessons from experience anywhere achieve universal publicity with extreme rapidity, and appropriate action can be advised, and possibly enforced, in a manner impossible without such an agency.

Thus we shall certainly see the rapid extension of the use of special tariffs which have transformed the competitive position of electricity when in use, to the entire industry.

It is possible to trace to the causes outlined—a marked change in the policy of municipalities owning electricity undertakings—and it is unreasonable to suppose that we have seen the full fruition of the forces which have been set in motion.

On the industrial side I regard "electricity as the saviour of Industry" as a pricked bubble. The truth is that unlimited electricity at the lowest price in the world would produce unappreciable results on our industrial situation. Cost of power or difficulty in obtaining it are not items which depressed industries would even catalogue among the causes of their troubles.

Need for Gas Commissioners.

Whether the value (to politicians) of electrical schemes as labour providers, or the natural dislike of going back on a policy once adopted, or the existence of the Commissioners, will prove the strongest force in that direction I am uncertain; but we must assume that the entanglement of the State with electricity supply will certainly continue. I fear that unless we secure an equally powerful friend at court, we shall find the State gradually drift into the same position as that of a municipality owning electricity but not gas-works. I am accordingly all for Gas Commissioners.

We are now, I hope, fully persuaded that in every branch of our business we are to-day fully competitive, and that in our main product we must be prepared to meet what can only be described as subsidized and State-aided competition.

Relative to the outlook of those who lived when gas was a real monopoly, we to-day are like a man brought up to think himself safe and waking to find himself under the necessity of making a living in a hard world.

Am I then pessimistic? By no means! Life on the guaranteed basis must be boring in the extreme. It provides no hard food for strong teeth to grind, no adequate outlet for energy and ambition. We need waste no tears upon times that are gone.

It may be that the competitive spirit of our race is declining, but I hope not, and as regards our little part of it, I hope real competition will only prove the spur to such effort as will raise gas supply to heights which might never otherwise have been dreamed of.

We owe it to the genius of Sir Francis Goodenough, whom the Industry will unite in honouring later this month, that in 1910 many subconscious and half comprehended feelings and questionings and ideas which existed in the minds of gas men were illuminated and clarified as by some sort of miracle.

It is difficult enough for those who saw the birth of the "B.C.G.A." to look back over the crowded years and recapture the thrill which that event provided.

Progress (or decadence) in affairs material or moral never follow a formal course. Periods of apparent stagnation alternate with shorter periods of relatively violent movement. The quiet times are not so still as they look, however, and many ideas and forces are gradually forming until, if we are lucky, a man appears who gathers all up, galvanizes men into activity, and an epoch has dawned.

"Gas Engineer and Manager" is a title claimed by controllers of gas undertakings ranging from outputs of a few millions to thousands of millions.

It is fairly obvious that no mortal could be expected to set out in search of omniscience, as a preparation for a career in the Gas Industry. Yet every beginner has to start somewhere, and to those bent on securing such success as our Industry affords, a primary study and a job to provide the foundations on which to build, must be respectively chosen and obtained.

There was for a long period no doubt whatever on this point. Advancement was for those whose entry to the Industry was through the engineering side. The works manager or assistant of to-day became the engineer and manager of to-morrow, and in exceptional cases, the multiple director of some later period. In the peculiar nature of our industry, which is precluded from adopting generally the super-station idea, it seems evident that for the majority of undertakings the chief officer must always be first a competent technician and works controller and afterwards a manager.

I feel strongly, however, that the centre of gravity has shifted materially. Distribution and salesmanship have advanced in complexity and importance and can no longer be regarded as inferior subjects for the consideration of a chief officer.

An Inevitable Necessity.

A definite line of study seems an inevitable necessity in the training of a professional man, and during many years this will determine, or be determined by, the nature of his job. He must therefore acquire the characteristic outlook of his calling during his formative years. Thus a man who worked and studied at constructional engineering from 18 to 30 will think differently and be a different man than if he had been a chemist, an accountant, a salesman, &c.

Any specialist branch provides opportunity for a successful career to the abnormally gifted, and many have so strong a bent and inclination towards their own special occupation that they never seek to extend their interest and responsibility.

To those who determine to be gas engineers and managers and thus occupy the position of chief controller of the fortunes of gas undertakings, I venture to suggest that the viewpoint from which they survey their work, from the earliest times, is of the utmost importance to them and to the Industry.

It will be impossible to perform the office of co-ordinating all the branches of activity which go to make a successful concern if the mind has been allowed to develop a one-sided view. There is no value attaching to any work which fails to benefit the concern as a whole.

Thus beautiful engineering may not pay, super efficient production of gas may fight a losing battle with inefficient commercial methods, distribution policy and performance, or salesmanship.

I am convinced that the tendency in our Industry is, and must continue to be, to ascribe increasing importance to commercial policy, sales organization, and distribution. This, if true, means that a higher status and improved prospects await those who specialize in these activities, if they bring with them education and personality, for which the work provides unlimited scope.

Increased business, lower costs, more goodwill, and more profits are the objects of all business, and every individual helps or impedes the good work. For the higher management, the committee room and the boardroom and the chief's office, I maintain the opinion to which I have frequently given expression—that the proper viewpoint is that of the salesman. I earnestly commend this idea to you. It doesn't mean you must be a salesman to hold it, or that actual salesmen themselves comprehend it.

It does mean, however, that every policy and action of every department and employee affects the commercial position and repute of the business, and the sum total provides the material with which salesmen work, and which they would naturally desire to have perfect, not in parts but throughout.

Votes of Thanks.

The President proposed a vote of thanks to Mr. Bloor for his Address; and Mr. S. H. Packer (Bradford), seconding, said that Mr. Bloor could always be counted upon to say something helpful and encouraging.

A vote of thanks was passed to the University authorities for the use of the meeting room, on the motion of Mr. S. T. S. Musgrove (Sheffield), seconded by Mr. Herbert Rhodes (Bradford).

Mr. H. J. Hodsman, in a brief reply, said that during the past twelve months considerable alterations had been going on at the University, towards the heavy cost of which the Yorkshire Junior Gas Association had made a generous contribution.

Scottish Junior Gas Association (Eastern District)

Presidential Address of Mr. David Yule, of Alloa.

On Oct. 4 a meeting of the Association was held in Edinburgh at the Gainsborough Hall, over 35 members being present. The proceedings opened with Mr. SCOBIE, the retiring President, expressing appreciation at the excellent turn-out of members. He thanked the Council and members for their help during his term of office, and, in introducing the new President, Mr. D. Yule, Alloa, who, he said, had taken an active interest in Junior affairs for a number of years, he appealed to the members to extend their support in a like manner.

Mr. YULE, in taking the Chair, expressed his thanks for the vote which had placed him in such a position that afternoon. He had ever taken a keen interest in the Eastern District Junior Gas Association's affairs, but had not been required to occupy quite such an important position. He thought, however, that with the members' support they would have a successful Session. His first duty as President was to hand over a memento to the immediate Past-President in recognition of his work and guidance as President. He trusted Mr. Scobie would long be spared to look upon the memento and that it would remind him of his connection with the Association. Mr. Scobie was then presented with a chiming clock with the following engraved on it: "Presented to Mr. J. Scobie, Dunfermline, President of the Scottish Junior Gas Association, Eastern District, 1929-30."

Mr. SCOBIE, in acknowledging this token of regard, expressed his thanks, and stated he would take as deep an interest in the Association's affairs in the future as he had done in the past.

Mr. MACDONALD (Prestonpans), one of the Honorary Members present, then presented the Paperette Prize Winners for 1929-30 with suitable Technical Books which were the gift of Mr. A. McG. Clark, of Port Glasgow, an ex-President of the Association.

Mr. A. L. DUFF, as representative of the Association on the Smoke Abatement League, then submitted a report on the work of the League during the past Session. Arising out of the report it was intimated that a request should be made to the National Gas Council for Scotland that they be affiliated to the League.

PRESIDENTIAL ADDRESS

of DAVID YULE, of Alloa.

I make no apology for having chosen for this Address some industrial applications of town gas in Alloa. The selection is not due to any specialized knowledge of fuel technique, but rather to a desire to promote vigorous discussion and to stimulate interest in this particular field. This increased interest and attention will lead, I hope, to development along some line which some among us may have overlooked.

I am bold enough to say that since the industrial load is now, and in future will increasingly be, of great consequence to the gas industry, we should make ourselves conversant with the possibilities industrially. In the domestic field the load has been of immense value, and the value in the future of the industrial load is inestimable.

COAL SMOKE.

On account of its importance to the nation as a whole, every person employed by a gas undertaking, no matter in what capacity, should be cognizant of the effect of coal smoke, its disastrous consequences, and the preventives therefor, and so become a potential salesman, or saleswoman, of coke and gas.

It is frequently difficult to carry out certain industrial processes without the emission of smoke, but it is unanimously accepted that the householder is by far the worst offender. I feel certain that many manufacturers—admittedly not of the "right-up-to-date" type—throughout our own areas have yet to learn what may be done by the use of gas in their line of business to the partial or entire exclusion of coal smoke.

The principal consideration in industrial heating operations is not necessarily fuel cost. Among many quite important advantages which accompany the use of town gas along this line are accuracy of temperature control, cleanliness, saving of labour, and invariably increased output. These and the many other points make a strong appeal to the far seeing commercial man of to-day. Because the possibilities of fuel gas may be well known to us, we must not assume that every manufacturer is already acquainted with them; rather let us think, and talk, of gas as a fuel for every purpose, and nothing but good to ourselves can result.

ALLOA'S INDUSTRIES.

As quite a few of you must already know, Alloa occupies a highly favourable situation in respect to all the essential requisites for the establishment and expansion of good commercial business. Small wonder is it, then, that it has long been famous for its products. Among the town's industries are the following: Coal mining; wool spinning; iron founding; distilleries; breweries; fireclay works (sanitary appliances); electric plant manufacturing; copper and brass works; glass manufacture; agricultural implement making; box making; and ship breaking.

In consequence of all this, and on account of the progressive policy of the gas undertaking, the sale of gas in Alloa for industrial purposes represents approximately 25 p.ct. of the total output—a high figure you will agree. It is, in fact, the largest percentage of any gas undertaking in the country, relative to the total output.

Here is a note on the current prices in Alloa, the quality being 440 B.Th.U.:

Ordinary Meters.—9·432d. per therm or 3s. 5½d. per 1000 c.ft.
Automatic Meters.—10·000d. ,, ,, 3s. 8d. ,, ,, ,,
Industrial.—Up to:

100,000 c.ft. per annum	7·500d.	per therm or	2s. 9d.	per 1000 c.ft.
500,000 ,, ,,	7·045d.	,, ,,	2s. 7d.	,, ,, ,,
1,000,000 ,, ,,	6·591d.	,, ,,	2s. 5d.	,, ,, ,,
3,000,000 ,, ,,	6·136d.	,, ,,	2s. 3d.	,, ,, ,,
5,000,000 ,, ,,	5·454d.	,, ,,	2s.	,, ,, ,,
7,500,000 ,, ,,	4·772d.	,, ,,	1s. 9d.	,, ,, ,,
10,000,000 ,, ,,	4·090d.	,, ,,	1s. 6d.	,, ,, ,,

A glance at these figures will make it clear that the policy of the Alloa Gas Department is to provide gas cheaply to industrial users. A consideration of what has been said respecting the percentage of total output used industrially is evidence enough of the success of the policy.

THE PRESIDENT.

DAVID YULE, of Alloa.

Mr. Yule received his early education at Sciennes School, and subsequently at Heriot Watt College, Edinburgh. He joined the Edinburgh Corporation Gas Department in 1910, with whom he served an apprenticeship as a gasfitter. As a young territorial he was mobilized at the outbreak of the war in August, 1914. He served in the 4th Royal Scots (The Queen's Edinburgh Rifles), and later in the Royal Military Provost Staff Corps. He was demobilized in 1919, when he rejoined the Edinburgh Gas Department as a fitter, from which position he was appointed in 1921 as District Inspector. He joined the Alloa Corporation Gas Department, with whom he is now employed as Distribution and Maintenance Superintendent, in 1927.

It may be argued that there is a moderately wide dissimilarity in the range of prices charged, but let me say it is justified. There are a number of important factors to observe in a consideration of the principle of differential charges for industrial gas-works cost of production, distribution costs, &c. But we must keep in mind that given a large sale of gas with a small margin of profit, and a large turnover, a large gross profit results.

The following figures giving the progress made in Alloa over a number of years are illustrative of the manufacturer's search in recent times for the ideal fuel. He may be said to measure

his future prosperity to no inconsiderable extent on the choice of a fuel which is really economical, regular in price and supply, and readily subject to accurate control.

—	Total Output.	Percentage Used Industrially.
Year ended May 15, 1923	206,284,400	7·84
,, ,, ,, 1924	217,425,500	12·08
,, ,, ,, 1925	198,038,200	13·23
,, ,, ,, 1926	204,879,200	17·09
,, ,, ,, 1927	201,014,700	15·31
,, ,, ,, 1928	202,045,200	17·79
,, ,, ,, 1929	212,800,500	18·72
,, ,, ,, 1930	231,220,500	24·67

Glass-Works Operations.

I hope that during the course of the present Session, the members will have an opportunity of examining the processes of bottle-making, finishing, and annealing, at one or other of the Alloa establishments. On your tour of inspection, if you keep in mind that there are two works working 24 hours seven days a week constantly, you may well wonder where the bottles, delivered 18 to 24 per minute from each machine, can be used up. In each works there are five such machines.

You will, too, wonder how it can be that Germany is still able to export vast quantities of bottles. These machines referred to above are so efficient and economical, serving to reduce the manufacturing costs to most reasonable limits, that you will be asking why we in this country are not able to provide bottles at quite as cheap a figure as the German competitor.

In the older of the two Alloa establishments, the Alloa Glass Works, there are three " houses " each with its own melting furnace fired by producer gas. In No. 1 and No. 2 houses, town gas, at ordinary pressure, is used with air blast, at 20 to 25 lbs. pressure, for the finishing process which involves, subsequent to the actual moulding, placing the mouth of each bottle for a few seconds opposite a hole in a firebox in which heat is highly localized. The temperature within the box is rather more than 2000° Fahr. This serves to form the smooth ring at the mouth of the bottle, and to remove any roughness that may remain from the moulding operations, which, unless remedied, would prove damaging to corks or stoppers.

Here is a group of interesting figures relating to this process:

Gas consumption per hour	260 c.ft.
Bottles treated ,,	1380
Weight of bottle	8¼ ozs.
Price of gas per 1000 c.ft.	1s. 6d.
Number of bottles per penny	294·8

According to the size of the bottle being manufactured, the number delivered by the machine over a period will vary. The weight of the metal, however, remains almost constant, and we therefore see that one pennyworth of gas deals with 156·6 lbs., and if the bottle being made is (say) a " 16-oz. milk " then one penny serves for 156 of these.

In No. 3 house more modern plant has recently been installed, and gas is used also with air blast firstly in a channel through which the molten metal passes from the main melting furnace into the forehearth. The forehearth is situated immediately over the feeder from which the molten metal is ultimately delivered to the forming or moulding machine.

The purpose is to bring the metal to a temperature at which it may be easily controlled by a plunger and shears, and be delivered, in correct quantities, and in a sufficiently plastic state, into the forming machine where it is blown in the moulds by air pressure.

The following figures relating to two forehearths and moulding machines may be of some interest:

Gas consumption per hour	980 c.ft.
Bottles made per hour	2400
Weight of bottle	9¾ ozs.
Price of gas per 1000 c.ft.	1s. 6d.
Number of bottles per penny	136

No. 3 house also contains the latest in gas or oil fired lehr annealing furnaces. The bottles are carried 4 or 6 at a time—depending on their size—into this oven where they are maintained for a short time at a temperature of 550° to 600° F. by gas and air blast, and are then allowed to cool down slowly to normal temperature by gradual steps. The floor of the oven takes the form of an automatic conveyor, and the length is about 60 ft. The fire box is situated at one end, and the goods are mechanically conveyed from the hot to the cold end.

The annealing is a most important process as glass being a poor conductor of heat, the bottles in cooling down should do so very slowly; otherwise the metal of the exterior solidifies before the internal portions can give up their heat, and internal strain must result. In order, therefore, to reduce excessive brittleness, re-heating by a soaking heat is required. This today is all the more necessary on account of the practice of using glass ware for pasteurizing foodstuffs.

The gas burner in this lehr is provided with automatic control adjustable to give various temperatures, but, in addition, the speed of travel through the oven can be varied. An electrically driven fan and a series of dampers give still greater elasticity so that the greatest accuracy of heat is instantly available.

Further, by the use of an " Electro-flow " pyrometer giving observation at any time, and the ready control offered by the manipulation of the gas valves, the whole process is put upon a really scientific footing, and results can be accurately repeated.

Gas consumption per hour	800 c ft.
Bottles made per hour	2400
Weight of bottle	9¾ ozs.
Price of gas per 1000 c.ft.	1s. 6d.
Number of bottles per penny	165

Branded Advertisements.

We have in Alloa, also, a number of firms who use branders to their considerable advantage for boosting produce. There can be no doubt that the brander is a more satisfactory machine than the stencil or printing instrument. The branded stamp is one which cannot be obliterated unless the case treated is destroyed beyond further use, and so should any cask, case, or box, be used for a purpose other than the original one, the advertisement still remains permanently.

These machines are available in many sizes. With a machine consuming from 80 to 100 c.ft. of gas per hour any number up to 200 articles may be branded in one hour. The output may vary according to the depth of brand required and the nature of the wood. For heavy box sides and casks a deep brand is usually applied as, of course, these have a long life, and not infrequently make many journeys, and in consequence are seen and noted times innumerable.

Metal Cutting.

The oxygen coal gas metal cutter is to the observer who first looks upon its performance a truly remarkable tool. For quite a long time oxygen has been used with acetylene for cutting up plates, girders, &c., by the scrap metal dealer principally.

The advantage of oxygen, with some suitable preheating agent, upon an accurate cutting tool is becoming more fully recognized. The laborious method of drilling round a plate in order to cut out a shape, and the subsequent considerable amount of machining required, has brought about this desirable change.

The most recent development in the oxygen cutting tool and profiling machine is in the employment of coal gas at ordinary pressures as the preheating agent. The machines are made in several sizes, and the cutting of metal into the most elaborate or irregular shapes may be carried out at remarkable speed relative to the drilling speeds.

There are several such machines in Alloa. One or two work on the pantograph principle. In this the operator places on a board situated immediately above the cutting bench a blue print or template of the article to be cut. A tracer wheel driven by a small electric motor 1/50th-H.P. is then guided round the print while, on another arm upon the cutting bench, the cutter proceeds over the metal to the desired shape. There are, in addition, circle-cutting and straight-line-cutting machines. On these the burner is mounted upon a carriage which once set cannot deviate from the proposed line.

These tools can deal with metal from ¼ in. to 8 in. thick. The speed of the cutter may be changed readily to the speed, for each thickness of plate, which experience has shown to give better results. The speeds are approximately as follows:

¼ in. thick	70 ft. cut per hour
½ in. ,,	65 ,, ,,
1 in. ,,	60 ,, ,,
2 in. ,,	45 ,, ,,
3 in. ,,	35 ,, ,,

The driving power is derived from the small 1/50th-H.P. electric motor, and the travelling speed of the tracer wheel can be varied by means of an adjustable governor. Where no electric supply is available clock-work motors can be fitted. These machines are manufactured by Messrs. Hancock & Co. (Engineers), Ltd., of Croydon, who manufacture also an oxygen coal gas hand cutting pipe, which, being trigger-operated, can be easily used by one hand. This tool may also be used for cutting metal from ¼ in. to 8 in. in thickness. The consumption of gas is approximately 30 c.ft. per hour on each machine.

The use of town gas instead of acetylene as the preheating agent has been found definitely to give more satisfactory and clean cuts. The edges on top and bottom are equally sharp, and as a result there is little, if any, machine work required after treatment for finishing up.

The experiences of the operators of these particular machines show that with coal gas the surfaces of the cut are not hardened to any great extent, and no subsequent annealing is required. These conditions do not apply with acetylene, which, giving an excessively hot superheating flame, tends unduly to heat up the metal, and, in consequence, may quite conceivably alter the nature of the material.

Gas Engines.

Gas engines are so well known to most members that little need be said here in respect thereto. They are used for a

variety of purposes in Alloa. Only seldom do we find a change over from gas. Indeed, there is a contemplated change over from electricity to gas at the present time. Two 35-B.H.P. motors are likely to be substituted by two gas engines of similar power.

For a number of years an electric motor was used to drive a booster which deals with the service to Clackmannan and Kennet on the eastern extremity of the area of supply, and another was used to drive the coal elevator and conveyor at the gas-works. Later, however, a 5-H.P. National V. gas engine, and a 10-H.P. National V. gas engine were installed respectively, and the monetary saving in each case has been really good.

The first cost of a gas engine is higher than an electric motor of the same power, but the average power user is nothing if not wary, and does not select any type of power producer solely on account of less initial cost. Reliability is the greatest factor.

What is more reliable than the modern gas engine? It requires little skilled labour or technical knowledge to run it. In event of an overload, the engine simply pulls up. With an electric motor, a sudden heavy load, or a switch pulled over too quickly, may result in the burning out of an armature, and a consequent lengthy stoppage in addition to an expensive repair.

For power purposes there is a choice of several systems—(*a*) the boiler and steam engine; (*b*) the electric motor; (*c*) the internal combustion engine. Because of this wide choice, and the competition which may be encountered, it is necessary to make a thorough analysis of the circumstances under which power is to be used upon a prospective job. The more extensive knowledge, therefore, that we assimilate in regard to gas engines, and their rivals, the more easily will an analysis be carried out.

Gas Furnaces.

Gas-heated furnaces are used in Alloa for a variety of purposes, principally for intermittent work for small jobs.

For the heat treatment of metals, those few advantages of using town gas as a fuel mentioned in the preceding pages apply equally here. Compared with solid fuel, the results obtained are better because standard uniform temperatures can be maintained with very low labour cost. I shall not attempt to go into any particular process on account of the limited time, and in any case I have no special figures of any outstanding interest to give in regard to this type of work.

The manufacturers of gas furnaces, alike with manufacturers of all other gas apparatus, are now doing, and have done for some time past, a great amount of work by a close study of both chemical and physical requirements in respect of design and manipulation which contribute to the utmost efficiency of their products, and it behoves us to ensure that once installed, these appliances be used to the very best advantage by our clients.

Good Service and Competition.

As at other industrial centres we in Alloa encounter a certain amount of competition from other fuels, and in order to retain the industrial customers we have at present, as well as seek new ones, it is essential that the best service possible be extended. I do not infer by this that a definite system of inspection of industrial appliances on "maintenance" lines has been established. This, to all but the very large undertakings—who can employ specialists—is not possible, but it is possible, and desirable, that there be close co-operation and goodwill between the industrial consumers and the gas undertaking. A satisfied consumer will be retained permanently by good service, and unless that be forthcoming it is little use securing fresh customers.

It will be agreed that if domestic consumers can be lost entirely, or partly, without our being consulted regarding (say) the lack of efficiency of an appliance when in all likelihood we might have been able to prove otherwise, it is clear that the same thing may apply to industrial consumers.

A competitive fuel may supersede gas not on its own merits, but rather on the demerits of an out-of-date and inefficient gas appliance. Close contact and personal efficiency in service will cause to be made known at once any dissatisfaction which may exist with a gas consuming appliance.

The competition which has to be met comes from electricity, coal, fuel, oil, and producer gas. Only in the case of fuel oil do we have a serious competitor for certain operations. The prices paid are as low as £3 per ton, but since it is a foreign product it appears by no means certain that such a low price—giving a fair margin of difference in price between gas—will long continue to exist.

It is difficult to express monetarily the advantages of one fuel over another, as there is also the factor of the particular merits, or otherwise, of each.

Discussion.

Mr. J. Scobie (Dunfermline), referring to competition, thought the electrician always seemed to be on the spot when any new work was being considered. He considered the 25 p.ct. of total output used industrially an exceptionally good figure, and asked if the rebate system was applicable to the ordinary consumer. He had noticed that the bottle works received their gas at 1s. 6d. per 1000 c.ft., and desired to know how many consumers there were at this rate. The oxygen coal gas metal cutter was a splendid machine, and he thought there were great possibilities in this market, as it obviated the use of cumbersome acetylene generating plant and offered facilities by being portable and adaptable. He considered that Mr. Yule had made a good point in his reference to the contemplated change from electricity to gas for power.

Mr. Yule, replying, said that in the rebate system they had no special scales for domestic consumers. They had two consumers above the 10-million figure.

Mr. T. M. Duncan (Perth) inquired if there were any other processes at the glass works beyond bottle-making, and if experiments had been carried out with a lower calorific value on such other processes.

Mr. Yule replied that only bottles were made at the Alloa Glass Works, in which ordinary town gas was employed.

Mr. C. D. Blackhall (Edinburgh), with regard to industrial appliances, asked who carried out the installation; and if the appliances were maintained for any specified period. Also were there any difficulties experienced with the burners?

Mr. Yule said the various firms concerned employed their own engineers in the erection and maintenance of the plant. The furnaces were dismantled and re-erected approximately every 14 months. Except during this period the consumption was fairly uniform. No difficulties were experienced with burners.

Mr. J. Ford (Inverness) asked if industrial gas was used in coal mining, wool spinning, or iron foundries. It occurred to him in comparing the figures of "total output" and "percentage used industrially" that there had been a loss over the domestic consumers between 1923 and 1930.

Mr. Yule replied that in the case of wool spinning gas was used in the laboratories for a variety of purposes, but for coal mining and iron foundries it was not used extensively. Owing to depression in trade in the shipbuilding industry in Alloa and the subsequent exodus of personnel to other areas, a large number of consumers had thereby been lost, and this accounted for the decrease.

Mr. D. Garrie (Burntisland) said he noticed the substantial price reduction for industrial consumers, and asked if they had in operation any such scale for domestic consumers. How was the largest consumer charged? Was he required to pay 7·5d. per therm for the first 100,000 c.ft., or did he get the 10 million at 4·09d. per therm?

Mr. Yule replied that a differential scale for domestic consumers was receiving attention. The 10-million consumer received all his gas at 4·09d. per therm. There were so many factors to consider that it would require a lengthy statement to go over the ground completely. In any contemplated installation or change of plant they were early on the spot and supplied any figures required for comparison. Producer gas was a competitor certainly, but was applicable only to large-scale plant.

Mr. R. J. Gavin (Kirkcaldy), referring to Mr. Garrie's remarks on producer gas, considered that this was not a serious competitor and was not applicable to the heating of fore hearths as referred to.

Mr. D. Garrie considered that if town gas could be supplied at a sufficiently low price it would surely be possible to accept his view that producer gas was a serious competitor. He had in mind a large and well-known aluminium work at Burntisland where producer gas was used extensively, and he was anxious to ascertain what reception a suggestion to change to town gas might meet.

Mr. Yule reminded them that the Alloa undertaking offered gas at 4d. per therm, and he considered that it would be extremely difficult for any works in Scotland to supply so cheaply.

Mr. C. Blackhall intimated that he was at one time employed by the firm named by Mr. Garrie. They had a number of very large works throughout Scotland, and by contracting for their supplies they could secure their needs at most attractive prices.

Mr. E. L. Farquhar (Kennoway) asked how long the industrial tariff had been in operation at Alloa, and if there had been any decided and immediate increase in consumption following its application. He considered that if differential rates were also allowed to large domestic consumers increased consumption would be obtained from this source as well. At Kennoway during the current year they had adopted a two-part tariff, and the results over the six months during which it had been in operation fully justified its adoption. The consumers accepting the scheme had increased their consumption by over a quarter of a million c.ft. in six months. The two-part scheme consists of a fixed "service" charge of £2 10s. per annum paid quarterly, and a "commodity" charge for all gas consumed at a reduction of 2s. 2d. per 1000 c.ft. from the ordinary price. The scheme as outlined simplifies book-keeping as compared to the graded scale employed at Alloa. There is one flat price per 1000 c.ft. for consumers under the tariff scheme, and the average price per 1000 c.ft. automatically adjusted itself according to the total consumption of the consumer during a year. He thought more publicity should be given to the successes of gas lighting over electricity from time to time.

Mr. Yule remarked that the sliding-scale had been in operation for a number of years, but was reviewed from time to time. The present prices were adopted in May of 1929. He was extremely interested in the two-part tariff for domestic consumers, and was pleased to learn that its introduction had proved successful. He suggested that Mr. Farquhar, after having given the scheme a trial over an extended period of time, should give them more details at some of their later meetings by providing a paper.

Mr. A. MacDonald (Prestonpans) gave some interesting details of the electrical grid scheme and some of its influences in his own area. He was sure electricity for lighting was not first, and, like the President, he thought the recent Lewisham experiments were an excellent illustration of this.

Mr. J. Scobie then moved a hearty vote of thanks to the President for the address and for his manner of dealing with the ensuing discussion.

This was duly carried, and Mr. Yule briefly replied.

XUM

REGISTER OF PATENTS

Prepayment Meters. No. 335,000.

KIRKEWHITE ENGINEERING COMPANY, LTD., and GOLDSPINK, G. E., both of Nottingham.

No. 22,036; July 18, 1929.

This invention relates to improvements in prepayment mechanism for gas meters, of the kind in which provision is made for readily changing the price of the supply, and further provision is made for readily adapting the mechanism for use with coins of different sizes and values. The usual practice, state the patentees, is to make such mechanism so that it can be adapted to work with either a penny or a shilling. One object of the present invention is to provide more convenient means for adapting the mechanism for use with either one coin or the other. Another object is to effect all the necessary changes at one point, so that access to the mechanism need only be provided at this point; and a further object is to simplify the construction.

An essential part of the mechanism referred to consists of a cylindrical coin casing fitted with an outer angularly adjustable cover which serves as a price changing disc; and the latter is formed with a coin-slot and carries an interior rotating guard-plate with a corresponding coin-slot and a coin-pocket. This guard-plate is carried by an axle centrally mounted in the price-changing disc and is rotated by means of an exterior handle. At the back of the interior of the cylindrical coin casing is a quantity wheel with ratchet teeth, and associated therewith is a spring-actuated pawl, which permits of the quantity wheel rotating in one direction only. The quantity wheel is mounted on an axle, which is carried through the back of the coin casing. This axle is formed with an external screw thread, and mounted thereon is an internally screw-threaded gas inlet valve controlling sleeve, which is in turn splined to a worm-wheel which is connected by two-speed worm and wheel gear, to the registering mechanism of the meter. The gas inlet valve is controlled by the screw-threaded sleeve, and the latter is moved in one direction in order to open the valve, by rotating the screw-threaded axle on which it is mounted, through the agency of the quantity wheel, and in the reverse direction in order to close the valve, by rotating the sleeve itself on the screw. The latter result is effected through the agency of the two-speed worm gear.

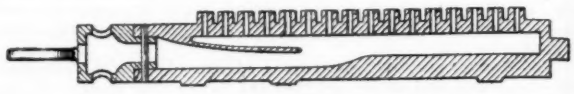
The required alteration to suit coins of different sizes and values is made by changing the price-changing disc and the guard-plate with coin pocket associated therewith, and the construction of the mechanism is such that this alteration also effects the necessary gear change, and thus adapts the meter to deliver a supply of gas which corresponds to the value of the coin which is to be used. The change gear is enclosed, and provision is made for locking the quantity wheel when the maximum amount has been prepaid.

Grill Burners.—No. 335,256.

KEMPTON, C. H., of Westminster Bridge Road, S.E. 1, and BISSELL, W., of Warwick.

No. 19,143; June 21, 1929.

This invention relates to gas burners for grills of the kind wherein the burner is rotatable about its longitudinal axis so that in one position the flames are projected above the fret, and in the other position impinge on the under surface thereof. The principal object is to provide an improved construction of grill burner whereby an even distribution of gas to the burner outlets throughout the length of the burner may be secured. The burner comprises a cylindrical member adapted to be rotatably mounted in the usual manner and cored out to form a converging inlet passage extending from one end of the member to a substantially middle position in the length

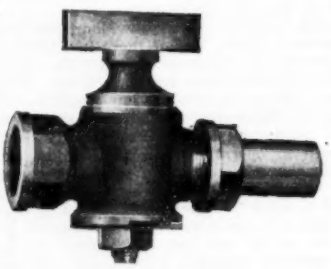


Kempton and Bissell's Grill Burner.

thereof, at which it merges into a longitudinal chamber extending in opposite directions towards the respective ends of the member for the supply of gas to the burner outlets arranged in longitudinal series in the wall of the member. The inlet passage and longitudinal chamber are so shaped that the gas is evenly distributed to the burner outlets without the necessity of careful adjustment of the bore thereof. At one end the member is adapted for the attachment of a mixing chamber having a co-axial hole in its end wall for the reception of the gas nozzle, and is provided at the other end with a co-axial cylindrical projection which rests in a suitable support, the arrangement being such that the burner tube is rotatable through a suitable angle determined by fixed stops. The mixing chamber may be fixed to the member by means of one or more pins or the like, and may be provided with a suitable operating handle for the angular adjustment of the burner for use as desired.

The idea will be seen from the accompanying diagram.

SAWER & PURVES
(BRANCH OF METERS LTD.)



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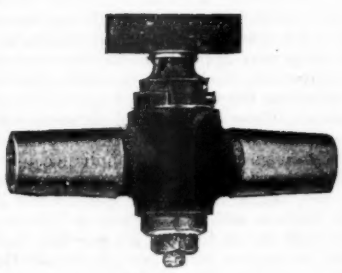

No. 64

MILES PLATTING
MANCHESTER
Telephone: 2289 Collyhurst

and

RADFORD ROAD
NOTTINGHAM
Telephone: 75202

Legal Intelligence

Nottingham Conspiracy Charges.

Further Serious Developments.

Consequent upon the examination which has been assiduously pursued by Messrs. Hubbart, Durose, & Pain, a leading firm of Nottingham Chartered Accountants, into the books of the City Corporation's Gas Department, there have been further grave developments. Two other defendants have been arrested for being concerned in the conspiracy to steal the moneys of the ratepayers. The two prisoners who were first arrested and remanded in custody, applications made on their behalf for bail being twice refused, were Leonard William G. Ball, 42, who had been chief of the clerical staff in the office of the Engineer and Manager of the Gas Department where he had been engaged for over twenty years, and John Ernest Allen, 47, a local builder. It was alleged that they had stolen money from the Corporation by means of bogus receipts for timber which had never been delivered. Their arrest was followed by the apprehension of Walter Ball, 56, manager to a Nottingham firm of plumbers' merchants, by whom he had been employed for over forty years. He was charged with complicity in the conspiracy, and was released on bail. Two further arrests followed in the early part of last week, the men being Henry Wright Gardiner, 53, ironmonger, and Frank Millis, 68, both of whom were charged with conspiracy. Gardiner was charged with stealing £90 and Millis £58.

Mr. A. WARD, Barrister, of Birmingham, said that he had been instructed by the Town Clerk to prosecute in all the cases. There had been previous remands; and now application was for a further remand. The investigations were still proceeding. Daily fresh developments were taking place, and there would be further charges made against the accused. He was instructed to oppose bail being granted to Leonard Ball and Allen. Walter Ball had been granted bail, and Counsel did not object to its renewal. With regard to Gardiner, he understood that he was in bad health and desirous of going into a home where he would be under a doctor; and he did not oppose bail there, provided that the accused went into a nursing home. A large sum was involved in the case, and he suggested that Gardiner's bail, if granted, should be in his own recognizances of £500 and one surety of £500 or two of £250 each. With regard to Millis, he suggested that the bail should be the prisoner himself in £200 and one surety of a similar amount or two of £100 each.

Lieut.-Col. H. BRADWELL applied for bail for Gardiner, which was granted. Bail was also granted to Millis.

A seventh arrest was made on Oct. 14, the additional defendant being a well-known local timber merchant, Henry Flint Scotton, aged 47, of 19, Willoughby Road, West Bridgford, a residential suburb of Nottingham, in which Leonard Ball had resided. He was brought up in custody before the City Magistrates the following day charged with conspiracy and stealing £66, the moneys of the Corporation. Accused was granted bail.

Metropolitan Gas Companies' Testings.

The Gas Referees' report of the official testings for the past quarter give the following average calorific values for the gas supplied by the Metropolitan Companies named.

Commercial Gas Company.—502·5 B.Th.U. (declared calorific value, 500 B.Th.U.).

Gas Light and Coke Company.—503·3 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—561·3 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—562·1 B.Th.U. (declared calorific value, 560 B.Th.U.).

Tottenham and District Gas Company.—502·2 B.Th.U. (declared calorific value, 500 B.Th.U.).

Wandsworth, Wimbledon, and Epsom District Gas Company.—473·1 B.Th.U. (declared calorific value, 470 B.Th.U.).

Trade Notes.

Recent Birmingham Contracts.

The Birmingham Corporation Gas Committee have recently placed contracts with Newton, Chambers, & Co., Ltd., for the supply, delivery, and erection of gas purifiers at the Windsor Street Gas-Works; and with the New Conveyor Company, Ltd., for the supply, delivery, and erection of a bucket elevator at the same works; and also for the supply, delivery, and erection of a skip hoist, traversers, and skips.

ELECTROLYSIS
OF GAS PIPES.

See p. 252.

Alexander Wright
AND COMPANY, LTD.

1, WESTMINSTER PALACE GARDENS,
VICTORIA ST., WESTMINSTER, S.W. 1

(Established 1843)

SPECIALISTS IN

Gasworks Instruments

Gas Calorimeters, : : :
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Thermometers, : : :
Liquid Flow Recorders, :
Photometers, : : etc.

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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Business in Gas stocks and shares last week was well maintained, and prices in many instances showed improvements, particularly in the case of debenture stocks. The ordinary stocks of the three Metropolitan Companies received considerable support, and in two cases record high prices for the year were established. Gas Light £1 units rose 6d. to 19s. 3d.-19s. 9d., the highest quotation for this security so far this year. The price of these units at the commencement of the year was 17s. 9d.-18s. 3d. and a year ago 18s. 1½d.-18s.7½d., so that, on the ordinary capital shown in the last published accounts, the appreciation in values since the latter date is no less than £1,047,888. The other high record was the price at which Commercial ordinary changed hands—viz., 97—though in this case the quotation was unchanged at 94-97. Other ordinary stocks to show improvements were the Alliance and Dublin, with a gain of 2 points to 62-65, and Barnet and Cardiff, each with a rise of 1 point to 107-110 and 95-98 respectively. Several debenture stocks firmed up, the chief of these being Bournemouth 3 p.ct. and Primitiva 4 p.ct. (1911) and 4 p.ct. consolidated, all with a gain of 2 points. The only falls last week concerned those companies operating abroad—viz., European 5 points and Montevideo 2½ points, the quotation being 100-110 for both stocks.

The Newcastle and Gateshead £1 units appear to be rather undervalued at the present time especially having regard to the higher rate of distribution last year. The present price of 15s. 6d.-16s. compares with 16s. 3d.-16s. 9d. at the commencement of the year and 16s. 9d.-17s. 3d. a year ago. A 5 p.ct. dividend was paid from 1923 to 1927, and this was increased to 5⅞ in 1928 and last year to £5 7s. 6d. The yield, therefore, at the current price on the latter rate is £6 16s. 6d. p.ct., which is a high return for such a first-class security, and amply justifies some appreciation in the present value of the stock. It will be noticed from the Stock and Share List that the Company's 3½ p.ct. debenture stock more than recovered the slight set-back of a week ago.

Coal Markets.

Some of the markets report a slightly better tone during the past week, due no doubt to seasonal influences. But the export districts are still suffering seriously from shortage of trade, and no headway whatever is being made with business for next year, pending the decision as to details of the marketing schemes. Competition from other producers, especially Poland and Germany, makes prospects appear very bad, prices being quoted with which British collieries can hardly hope to compete.

Gas coal trade is still very slow for the time of year, though the better qualities have been rather better stemmed in the last few days. Quotations are maintained by restriction of output to available orders, and Wear Specials ask about 15s. to 15s. 3d. f.o.b., best qualities 14s. 6d. to 14s. 9d., and seconds 12s. 6d. to 13s. 3d. Yorkshire screened gas for export is 16s. 6d. to 18s. 6d.

The steady demand for gas coke is maintained as one of the few good features of the markets, and orders are being well booked for prompt and forward at round 21s. 6d.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 20.

The prices of tar products remain unchanged, pitch being 47s. 6d. per ton f.o.b., creosote for export 6d. to 6¼d. per gallon f.o.b., pure toluole about 2s. 2d. per gallon, pure benzole 1s. 9d. to 1s. 10d. per gallon, 95/160 solvent naphtha 1s. 5d. to 1s. 6d. per gallon, pyridine bases about 3s. 9d. per gallon. The prices for spirits are all *ex* sellers' works.

Tar Products in the Provinces.

Oct. 20.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 24s. Pitch—East Coast, 46s. f.o.b. West Coast, Manchester, Liverpool, Clyde, 46s. f.o.b.* Toluole, naked, North, 1s. 6¼d. to 1s. 7¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 2¼d. to 1s. 2¾d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3¼d. to 3¾d.; low gravity, 1¼d.; Scotland, 3¼d. to 3¾d. Heavy oils, in bulk, North, 5¾d. to 6d. Carbolic acid, 60's, 1s. 4¼d. to 1s. 6d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Oct.* 18.

Some orders have been placed during the week, but no upward tendency in prices can be recorded. Stocks of most products continue high.

Pitch.—There is still a dearth of orders, although inquiries are plentiful. Export quotations remain at 45s. to 47s. 6d. per ton f.o.b. Glasgow, while home price is 45s. per ton f.o.r. makers' works.

Refined tar to Ministry of Transport Specification is unchanged at 3d. to 3¼d. per gallon f.o.r. naked.

Creosote.—The better grades continue to find a fair market. B.E.S.A. Specification is 2¾d. to 3¼d. per gallon; low gravity, 3d. to 3½d. per gallon; and neutral oil, 3d. to 3¼d. per gallon—all *ex* makers' works in bulk.

Cresylic.—Small parcels have been moving, but no alteration has been made in quotations. Pale, 97/99 p.ct., is 1s. 6¾d. to 1s. 7¾d. per gallon; dark, 97/99 p.ct., 1s. 5¾d. to 1s. 6¾d. per gallon; and pale, 99/100 p.ct., 1s. 8¾d. to 1s. 9¾d. per gallon—all f.o.r. works.

Crude naphtha.—Value is steady at 4d. to 4½d. per gallon f.o.r. makers' works in bulk.

Solvent naphtha.—Orders are scarce, and prices are unstable at 1s. 2¾d. to 1s. 3d. per gallon for 90/160 and 1s. to 1s. 0¾d. per gallon for 90/190.

Motor benzole.—New business is scarce, and value is about 1s. 5d. per gallon free on rails.

Pyridines are unchanged, 90/160 grade being nominal at 3s. to 3s. 3d. per gallon.

Benzole Prices.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole	0 8	to 0 9	per gallon at works
Motor "	1 3½	" 1 4½	" "
Pure "	1 8	" 1 9	" "

Sulphate of Ammonia.

Prices for Season 1930-31.

Imperial Chemical Industries, Ltd., have issued a circular relating to the prices at which they are prepared until further notice to book orders for sulphate of ammonia for home agricultural use. The right is reserved to raise prices at any time by sending out a printed notice to that effect. Any such increase in price will apply to all orders received after the date of issue of the notice. There will be no allowance for taking delivery *ex* works.

The firm offer to sell sulphate of ammonia for home agricultural use at the following prices for delivery in:

	£ s. d.
1930—	
October	9 1 0
November	9 3 0
December	9 5 0
1931—	
January	9 8 0
February-June	9 10 0

per ton for neutral quality guaranteed to contain 20·60 p.ct. of nitrogen by weight and not to contain more than 0·025 p.ct. of free acid (H_2SO_4), and to be in readily friable condition at the time of delivery, delivered to consumer's nearest station or wharf in Great Britain (or c.i.f. main ports for the Isle of Man) for prompt cash payment in lots of 6 tons and upwards, packed in single bags containing about 2 cwt. net to be supplied free by sellers, tare allowed. When credit is given, a reasonable extra charge may be made, but the discount allowed for prompt payment should be quoted on the invoice. The above prices will also apply to deliveries of 1 ton and upwards *ex* works or *ex* store to buyers' road vehicle. A statement of conditions follows.

Contracts Advertised To-Day.

Retorts.

The Sittingbourne Urban District Council invite tenders for the supply, delivery, and erection of an installation of vertical retorts. [Advert. on p. 250.]

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 17	Rise or Fall on Week.	Transact'ns Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c max. C.	73–78	..	..
522,992	,,	,,	4	4	Do. 4 p.c. Pref.	68–71	..	..
1,551,868	,,	Oct. 9	7½	7½	Alliance & Dublin Ord.	93–96	..	94½–95
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	62–65	+2	..
522,655	,,	Aug. 28	7	7	Barnet Ord. 7 p.c.	107–110	+1	107¾–109
300,000	1	Apl. 24	1/4½	1/7½	Bombay, Ltd.	16/–18/–	..	..
174,500	10	Aug. 14	9	9	Bournemouth 5 p.c.	14–15	..	..
500,050	10	,,	7	7	Do. B 7 p.c.	12½–12⅝	..	12½–12⅝
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10⅝–11¼	..	..
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb.	57–60	+2	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75–78	+1	..
357,900	,,	Aug. 28	7½	7½	Brighton & Hove 6 p.c. Con.	112–117	..	..
871,880	,,	,,	6½	6½	Do. 5 p.c. Con.	101–104	..	..
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	90–91*a*	..	..
855,000	,,	Sept. 25	8	7	British Ord.	108–113	..	111–111½
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	112–117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72–75	..	75
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	95–98	..	..
100,000	,,	June 26	5	5	Cambridge 5 p.c. Deb.	95–98	+1	..
100,000	10	May 22	6	10	Cape Town, Ltd.	9–10	..	9⅝–9¼
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref.	6½–7½	..	6¾–7
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb.	71–76	..	74½–75¾
626,860	,,	July 24	6	6	Cardiff Con. Ord.	95–98	+1	96½–97
237,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb.	98–101	+1	..
157,150	,,	Aug. 14	6½	5	Chester 5 p.c. Ord.	86–91*b*	..	..
98,936	1	Oct. 9	†2/–	†2/–	Colombo, Ltd. Ord.	32/–34/–*	..	..
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	18/–20/–*	..	..
609,204	* 1	Oct. 9	1/9½	1/4½	Colonial Gas Assn. Ld. Ord	16/6–18/6*	..	..
296,053	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	18/–20/–*	..	..
2,073,280	Stk.	July 24	7	6	Commercial Ord.	94–97	..	95½–97
475,000	,,	June 26	3	3	Do. 3 p.c. Deb.	57–60	+1	..
787,560	,,	Aug. 14	7	7	Croydon sliding scale	104–107	*e*	106–106¾
453,100	,,	,,	5	5	Do. max. div.	81–84	..	..
542,270	,,	Aug. 14	10	7	Derby Con.	115–125*e*	..	..
55,000	,,	June 26	4	4	Do. Deb.	65–70*e*	..	..
209,000	,,	Aug. 28	5	5	East Hull Ord. 5 p.c.	69–71	..	..
1,002,180	,,	Sept. 25	†7*g*	†4	European, Ltd.	100–110	–5	100
18,629,125	,,	July 24	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	19/3–19/9*f*	+·/6	19/–19/9
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63–65	..	64½
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	78–81	..	79¼–80½
5,602,620	,,	June 26	3	3	Do. 3 p.c. Con. Deb.	60–63	..	62–62¾
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	100–103	..	102⅜
161,480	,,	Sept. 11	10	10	Harrogate Cons. 10 p.c. max.	155–160	..	..
82,500	,,	Aug. 28	7	7	Hastings & St. L. 5 p.c. Conv.	97–102	..	99
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	76–81	..	..
70,000	10	Oct. 9	‖	10	Hongkong & China, Ltd.	13–14*	..	..
213,200	Stk.	Aug. 14	6	6	Hornsey Con. 3½ p.c.	88–91	..	90–90½
2,436,594	,,	May 22	10	25	Imperial Continental Cap.	330–350	..	334–345
223,130	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	80–85	..	..
235,242	,,	Aug. 14	8½	8½	Lea Bridge 5 p.c. Ord.	123–128	..	..
2,145,907	,,	Aug. 14	6	6	Liverpool 5 p.c. Ord.	95–96*b*	..	..
600,000	,,	Sept. 25	7	7	Do. 7 p.c. Red. Pref.	97½–99½*b*	..	..
165,736	,,	Aug. 28	8	9	Maidstone 5 p.c. Cap.	120–125	..	..
63,480	,,	June 26	3	3	Do. 3 p.c. Deb.	51–54	..	..
75,000	5	June 26	†10	†10	Malta & Mediterranean	5¼–6	..	..
392,000	—	Oct. 1	5½	5½	Metrop'itan (of Melbourne) 5½ p.c. Red. Deb.	88–91	..	..
675,000	Stk.	May 22	†6	†8	Montevideo, Ltd.	100–110	–2½	..
2,061,315	,,	July 24	5⅜	5	Newcastle & Gateshead Con.	15/6–16/–*d*	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	71½–72½*d*	..	..
691,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb.	67⅛–68½*d*	+¾	..
169,940	,,	Aug. 28	7⅛	7⅛	North Middlesex 6 p.c. Con.	106–111	..	..
396,160	,,	Aug. 14	5	5	Northampton 5 p.c. max.	76–81	..	..
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	108–113	..	..
60,000	5	13 My., '15	—	—	Ottoman	0–¼	..	..
205,162	Stk.	June 26	8	8	Plym'th & Stonehouse 5 p.c.	110 115	..	..
424,416	,,	Aug. 28	8	8	Portsm'th Con. Stk. 4 p.c. Std	107–112	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	77–80	..	..
186,000	100	June 2	4	4	Primitiva 4 p.c. Red. Deb.	96–99	..	..
677,837	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	83–86	+2	84½
371,496	,,	June 26	4	4	Do. 4 p.c. Cons. Deb.	83–86	+2	84–85
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref.	8½–8⅝	..	..
1,736,968	Stk.	Aug. 28	6½	6½	Sheffield Cons.	100–103*e*	..	..
95,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76–78*e*	..	..
90,000	10	June 5	‡4	‡5	South African	4–6	..	..
6,709,895	Stk.	Aug. 14	7½	5	South Met. Ord.	102–104	..	102½–103½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	107–110	..	108½–109½
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	59–62	..	..
734,000	,,	Sept. 11	6½	6½	Do. 6½ p.c. Red. Db.	99–102	..	..
91,500	,,	Aug. 14	8½	8½	South Shields Con.	105–107*d*	..	..
1,543,795	,,	July 24	6½	6½	South Suburban Ord. 5 p.c.	100–103	..	..
468,837	,,	June 26	5	5	Do. 5 p.c. Deb.	95–98	..	..
647,740	,,	Aug. 28	5	5	Southampton Ord. 5 p.c. max.	75–78	..	..
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	73–76	..	..
179,014	,,	July 24	8	8	Sutton Ord.	110–113	..	..
94,500	,,	June 26	5	5	Do. 5 p.c. Deb.	93–96	..	..
250,000	,,	Aug. 28	7	7	Swansea 7 p.c. Red. Pref.	98–101	..	..
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb.	98–101	..	..
1,076,490	,,	July 24	6⅝	6⅝	Tottenham District Ord.	102–106	..	103½–104
150,000	,,	,,	5⅓	5⅓	Do. 5⅓ p.c. Pref.	95–98	..	..
199,005	,,	June 26	4	4	Do. 4 p.c. Deb.	75–78	..	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	3¾–4¾	..	4
85,701	Stk.	Sept. 25	6	6	Do. 6 p.c. Red. Deb.	73–78	..	..
309,094	,,	Aug. 28	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	95–100	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	85–90	..	..
1,180,970	,,	July 10	—	7	Wandsworth, Wimbledon, and Epsom Cons.	107–112	..	109
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	90–93	..	90–91
488,344	,,	June 26	5	5	Do. 5 p.c. Deb.	98–101	..	98–101

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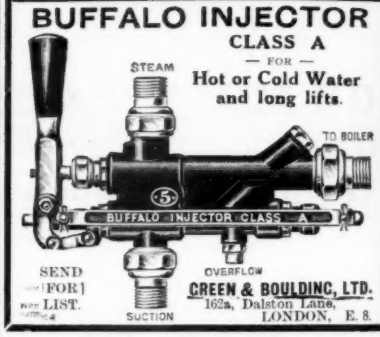

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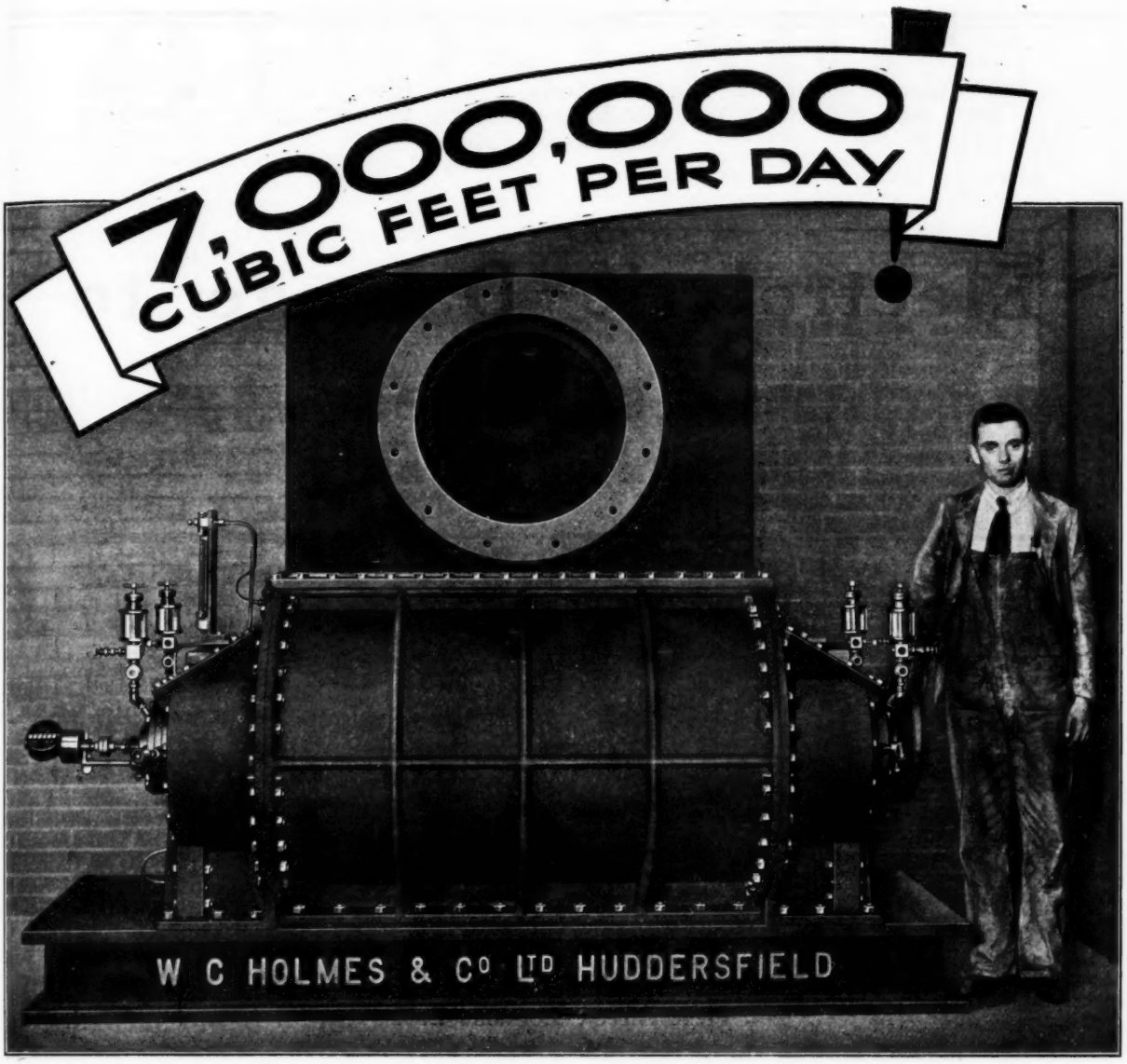

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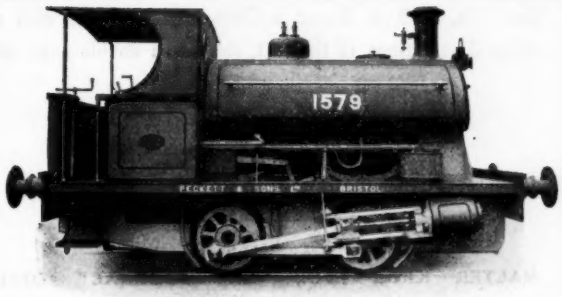

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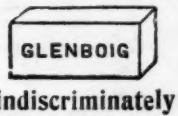
TRADE 

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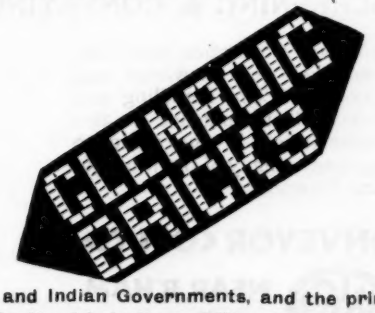

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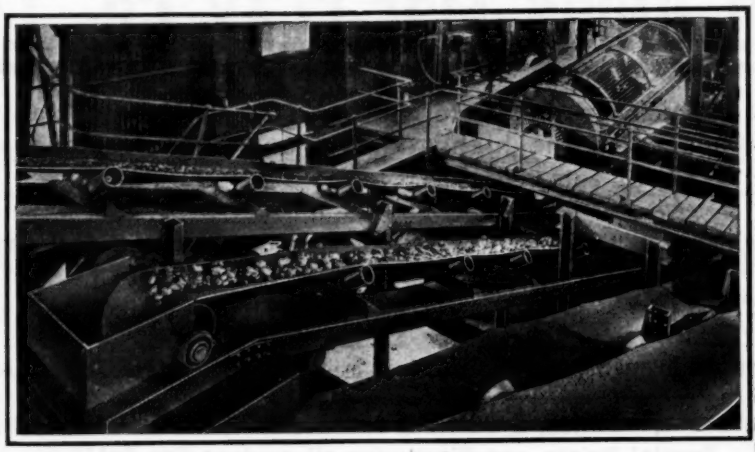

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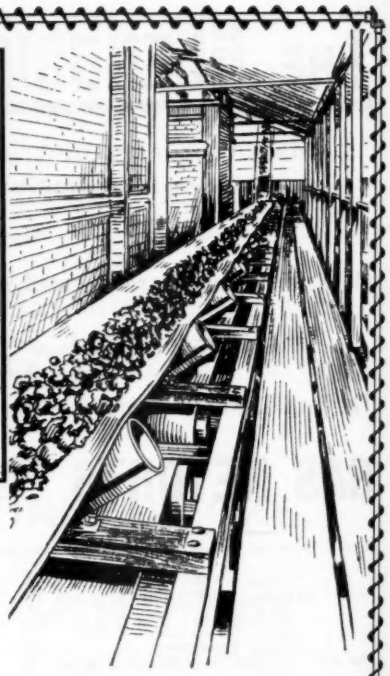

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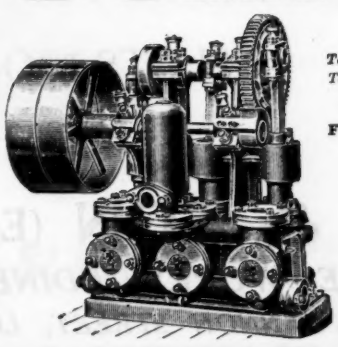
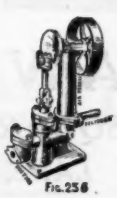

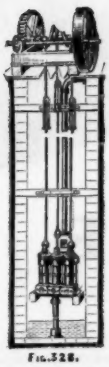
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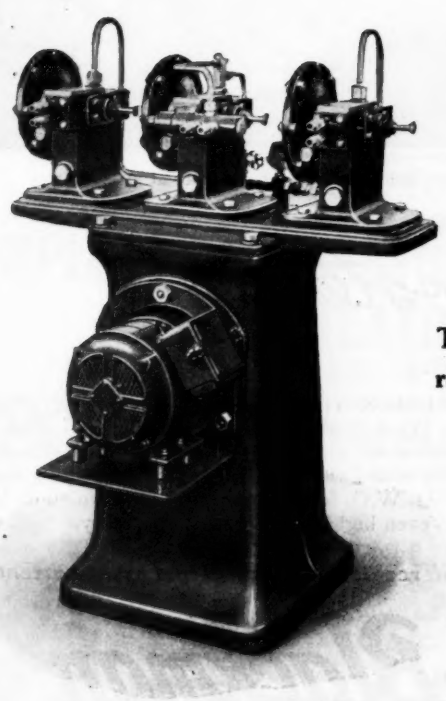

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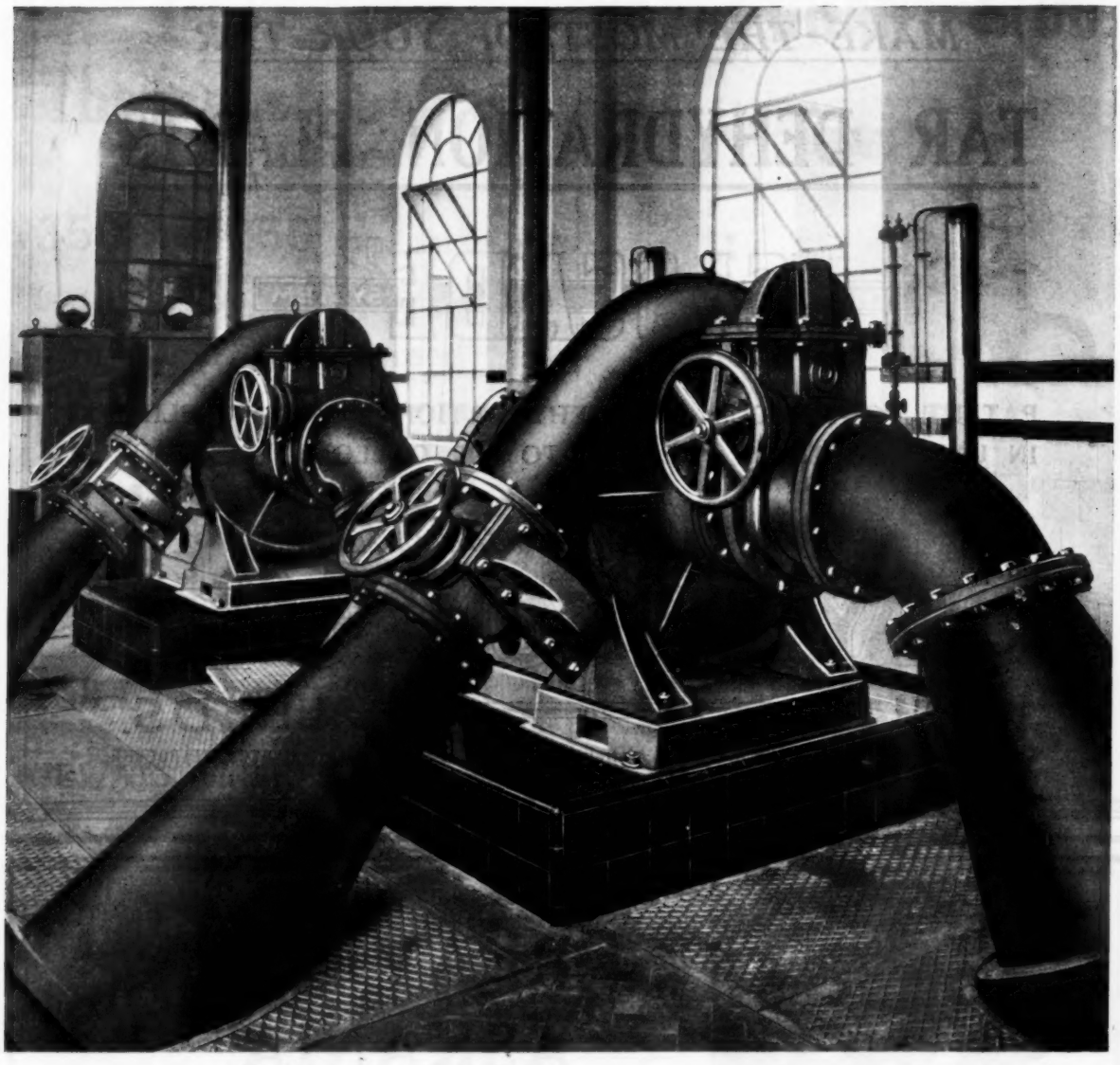

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